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ANILINE BLACK.

COTTON AND SILK DYEING.

According to Mr. Cam. Kœchlin, these fibers may be dyed in a solution made of—water, 20to 30 parts; chlorate of potassa, 1 part; sal ammoniac, 1 part; chloride of copper, 1 part; Aniline, 1 part, and hydrochloric acid, 1 part, previously mixed together.

The fabric or yarn is dried in ageing rooms at a low temperature for 24 hours, and washed afterwards

WOOL DYEING OR PRINTING.

Mr. J. Lightfoot prepares the wool by a kind of oxidation made as follows: 1 part of bleaching powder is dissolved in 10 parts of water. Then for 1 pound of wool, take about a pint of the above solution, dilute it with six gallons of water, and add 3 ozs. of muriatic acid. In this bath, which is at the temperature of 100° Fah., work the wool during 20 or 30 minutes, and until it has acquired a yellowish tint. Then wash it thoroughly and let it dry.

Wool and mixed fabrics thus prepared may be dyed and printed in the usual way.

SILK PRINTING.

In this case silk is to be vegetablized (we have already the word animalized) by an immersion in a bath of cellulose dissolved in ammoniacal copper oxide. We think this process quite delicate, on account of the action of ammonia on the silk.

CALICO PRINTING.

The first application of aniline black to calico printing was made by Mr. John Lightfoot. One of the early printing mixtures was made of—Water, 5½ qts.; white starch, 1 lb. 14 ozs.; chlorate of potassa, 6 ozs.; hydrochlorate of aniline, 1 lb.; sulphate or chloride of copper, 5 ozs.

The aniline black obtained was very fine and fast; but the great quantity of copper salt employed was found to be injurious both to the fabric and to the metallic printing rollers.

Subsequent experiments made by Messrs. C. Kœchlin, Cordillot, and Lauth, have led to the substitution of sulphide of copper for the sulphate and chloride of this metal, whose presence seems indispensable to the production of aniline black. A good printing paste, which does not weaken the fabrics and does not corrode the scrapers and the rollers of the printing apparatus, is made as follows:

Heat and digest—water, 1 lb.; starch, 2 lbs.; sulphide of copper, 8 ozs. On the other hand, mix and heat—torrefied starch, 2 lbs. 6 ozs. water 4 lbs.; gum tragacanth water, 1 qt.; hydrochlorate of aniline, 1 lb. 9½ ozs.; sal ammoniac, 3½ ozs.; chlorate of potassa, 9½ ozs. Then mix the two compositions, print, and expose the fabric in the ageing room for 24 hours, and at a temperature from 77° to 104° Fah.

Here is another paste by Mr. Käppelin: Starch paste, 2⅕ gals., chlorate of potassa, 7 oz.; gum tragacanth water 5½ lbs.; sulphide of copper 14 ozs.; sal ammoniac, 9 ozs.; a salt of aniline (tartrate) 2⅕ lbs., which is added last.

Tartrate of aniline does not corrode the steel scrapers, and is gradually transformed into hydrochlorate of aniline by the sal ammoniac of the mixture. Nitrate and hydrochlorate of aniline are the only salts of aniline which can produce the black

After 24 hours' standing in the ageing room, the prints are drawn through a bath containing 2 per cent of carbonate of soda, steamed, and washed.

Acids will turn the color to green, but alkalies will restore the black. A solution of bichromate of potassa intensifies the color; but an excess of this salt is apt to impart a reddish hue.

The best aniline for black is the one which contains a mixture of aniline and toluidine, and which is sought for in themanufacture of reds.

The sulphide of copper is made by dissolving at the ordinary temperature 2 parts of sublimed sulphur in 2 parts of caustic soda, at 38° Baumé. After 24 hours' standing and frequent stirrings, the solution is complete, and is thrown into a warm solution of 10 parts of sulphate of copper in 250 parts of water. The precipitate is washed and drained until about 10 pints are obtained, each pint therefore corresponds to 1 pound of sulphate of copper.

Lucas paste.—It contains acetate of copper and hydrochlorate of aniline, without sal-ammoniac, and has been submitted to a peculiar process. When used, this paste is mixed with 6 to 8 times its volume of starch paste. The temperature of the ageing room is about 104° Fah.

Paraf's paste.—It is a mixture of hydrochlorate of aniline, chlorate of potassa, hydrofluosilicic acid, and a thickening. It produces a very fine black when applied with copper or brass rollers, which furnish the copper necessary to the development of the color. If no copper is present, the shade is only a dirty blue.

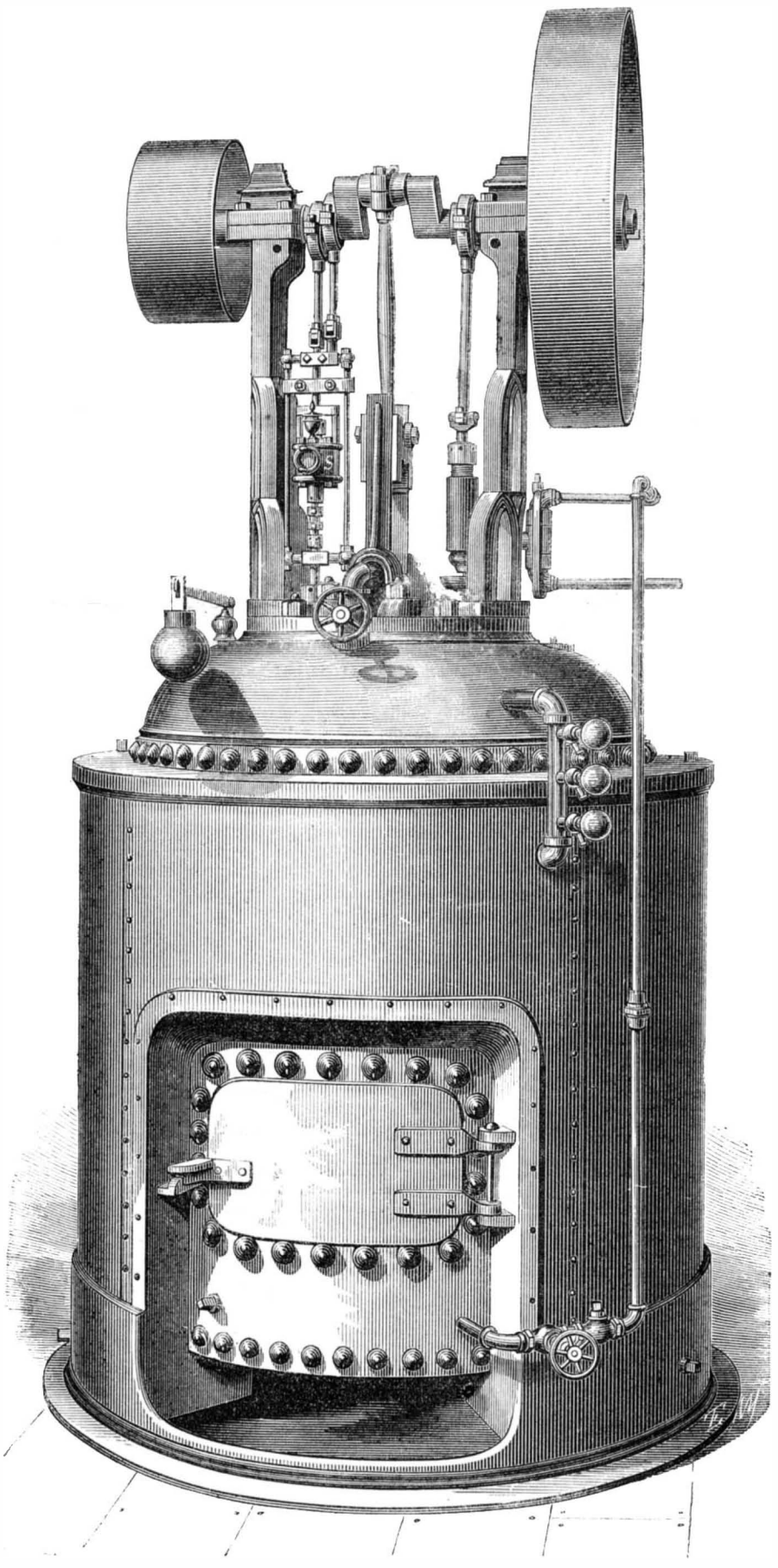
All these aniline blacks are remarkable as being very fast, unalterable by acids or alkalies, and even by chlorine to a certain point. If chlorine is not used in great excess, the black color will reappear; if in excess, the color remains fallow. Aniline black may also be printed simultaneously with madder and most steam colors.

All the compositions for producing aniline black must be acid, and the more acid there is, the more rapid is the production of the black. We ought, however, to remain within proper limits, otherwise the fiber may be weakened.

The degree of acidity of the paste will also vary with the thickenings employed. Gum senegal requires more acidity than torrefied starch, and the latter more so than white starch or gum tragacanth.

In printing aniline black care should be taken not to print upon, or too near other places previously mordanted; the mordant would be acted upon, and if it contains acetic acid, this acid once liberated would prevent the formation of black, which will be only gray.

There is also danger of spontaneous combustion, so rapid is the oxidation going on, when the printed piece is allowed to remain folded and wet. It should be immediately spread out in the ageing room. —*Dictionary of Dyeing and Calico Printing.*



BAXTER'S PORTABLE STEAM ENGINE.

Improvement in Steam Generators, and in Steam Engine Valve Devices.

The portable engine which forms the subject of this article, has attracted considerable attention from the simplicity of its construction, and its efficiency. It is an ingenious method of applying principles in steam engineering acknowledged to be theoretically correct, but always considered as practically difficult of attainment. The three prominent features of this engine are, first, the placing of the cylinder within the steam dome of the boiler, second, the construction of the boiler; and, third, the cut-off valve; the latter being the subject of special patent, as well as the boiler. The inventor, Mr. Wm. Baxter, of Newark, N. J., has employed some novel applications of mechanical principles in the perfection of this engine, exhibiting a fertility of device which sustains the reputation acquired by his improvements in other fields of invention.

Fig. 1, is a perspective view of the engine and boiler combined, with the valve improvement attached; the construction of which will be easily understood by reference to Figs. 2, 3, and 4, which respectively represent a vertical section of the steam generator and elevations of the working parts of the engine, represented in a somewhat simplified form to show the main features more clearly, and to aid in its description.

The heated products of combustion rise from the grate, spread in the combustion chamber, A, Fig. 2, descend through the vertical flues, B, into the gas chamber, C, then again ascend through the smoke chamber D, and finally escape through E. This smoke chamber is formed by an external cylindrical jacket extending entirely around the boiler proper, rising and contracting to meet the boiler below the water line as shown in the engraving.

The water envelops the top of the combustion chamber, A, and fills the space between the descending flues and the smoke chamber, and also between the flues and the combustion chamber, surrounding the flues, and covering the top plate of the gas chamber; thus securing a very large heating surface in an extremely compact manner, and leaving ample space in the steam dome, in which the cylinder is placed vertically, as shown in the engraving. The cylinder is attached to a circular bed plate, which also forms a cap to the steam dome. The pillars sustaining the crank shaft and its attachments also rest upon, and are bolted to this bed plate, so that in transportation the removal of the bolts which hold the bed-plate in position, separates the engine proper from the boiler, without disturbing the adjustment of the valve, or otherwise affecting the relation of the working parts.

These parts are shown in Figs. 3 and 4—at least such as are essential to this description; the fly wheel and a portion of the crank shaft being broken away to admit of enlarging the parts desired to be shown. Fig. 3 shows the bed plate, H, above mentioned with the cylinder and valve in place, and the peculiar and novel device designed to act as both a regulator and cut-off.

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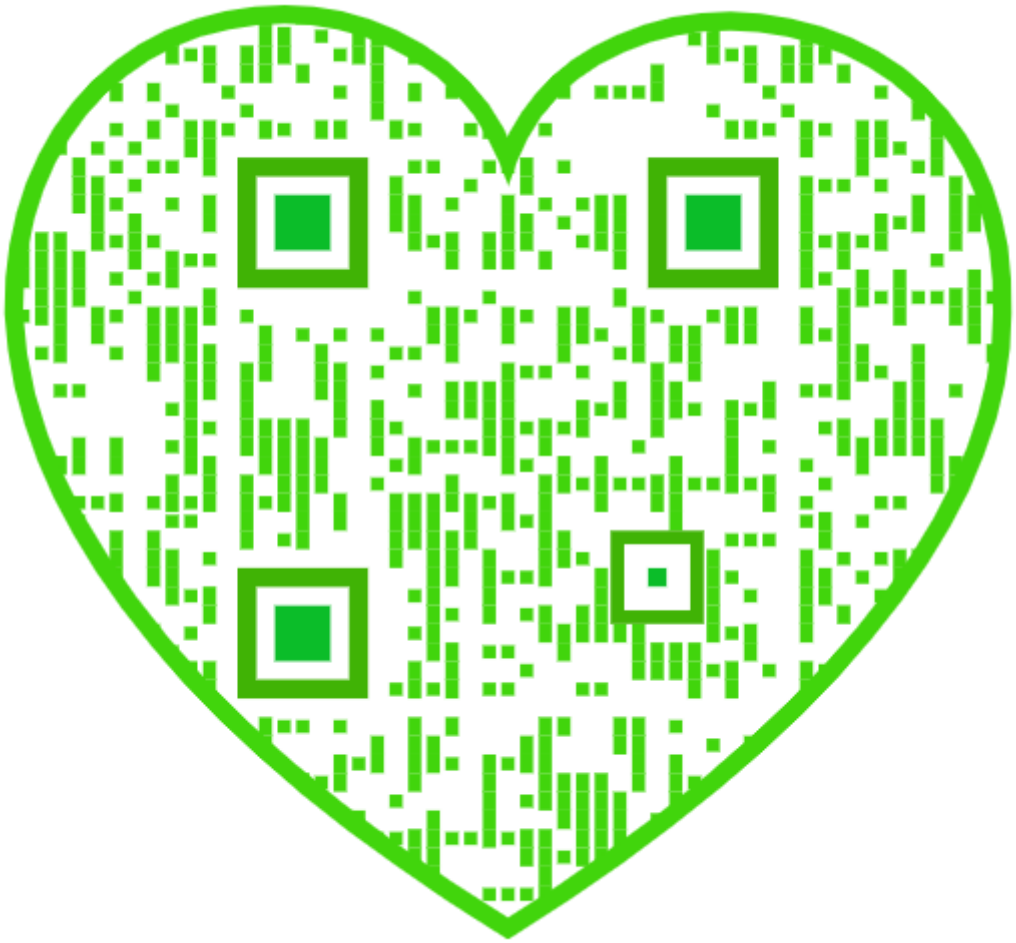
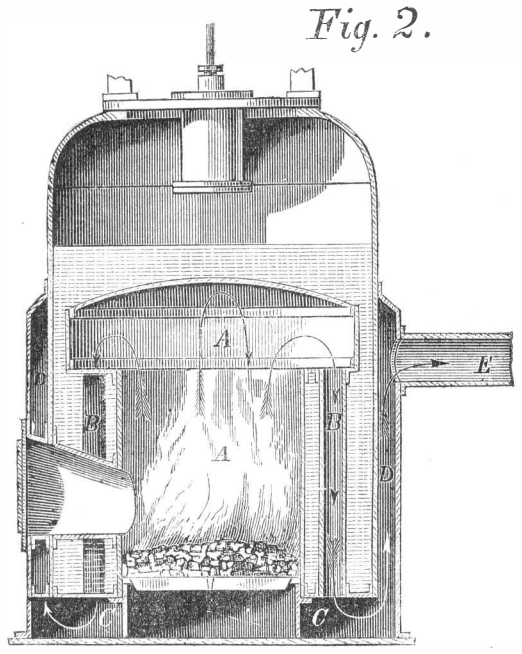


The valve, F, has a sleeve, G, attached to it, which plays vertically through a stuffing box in the bed plate, H. This sleeve with the main valve, F, is driven by the eccentric, I. Through the sleeve, G, plays a connecting rod, J, which works the cut-off valve, K. The rod, J, is attached to a piston, L, Fig. 4, which plays in an oil cylinder, M. The spaces on either side of the piston, L, communicate with each other through a port, N, in the wall of the oil cylinder. The oil cylinder, M, is further connected by the rod, O, with the eccentric, P, Fig. 3, which imparts motion to M, and through it to the piston, L, the rod, J, and the cut-off valve, K.

The cylinder, M, is filled with oil, which, when the port, N, is fully opened, is transferred from one side of the piston, L, to the other at each stroke, so that the latter will move the cut-off valve, only when it reaches the top or bottom of M; but when this port is partially cut off by the screw valve, S, Figs. 1 and 4, so that the power required to force the oil

Fig. 2.



VERTICAL SECTION OF STEAM GENERATOR.

Fig. 3.

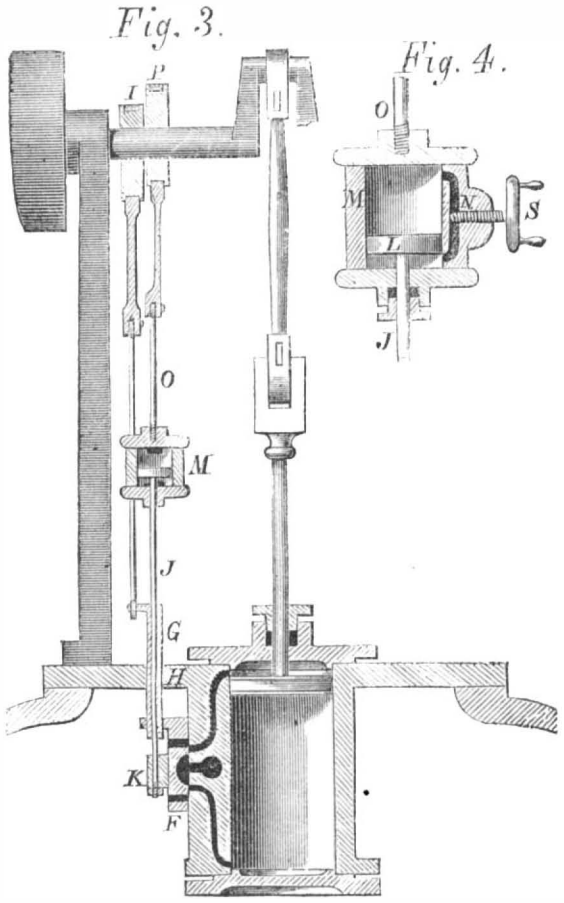


Fig. 4.

ELEVATION OF WORKING PARTS OF THE ENGINE.

through the port is greater than that required to move the cut-off valve, K, the latter moves before the oil in M has been all passed through the port, N, and the steam may thus be cut off at any part of the stroke, by the proper adjustment of the screw valve, S. The action of this cut-off is so delicate that the slightest turning of S affects the movement of the engine, which may be as readily stopped by the closing of the port, N, as by shutting the throttle valve, since the closing of this port makes the cut-off valve cover either port in the principal valve, F, at precisely the time when it otherwise would begin to admit steam to the cylinder.

Whenever also the motion of the engine has a tendency to accelerate by the sudden throwing off of belts or any other cause, the oil cylinder, M, and its piston act as a governor, since any acceleration of the crank shaft is at once communicated through the eccentric, P, Fig. 3, to the cylinder, M, and as the power required to force a given quantity of oil through the port, N, increases relatively to the velocity with which it is moved, the piston, L, is moved more rapidly than before the acceleration, and cuts off steam sooner.

The valves are held to their seats by the simple pressure of the steam in the boiler, as shown in Fig. 3.

The arrangement of the parts gives a very compact and neat appearance to the engine; and the construction of the boiler, together with the immersion of the cylinder in steam of the same temperature as that which enters it, enables the inventor to use the method of expansion to great advantage. The result is a very economical use of fuel. We are informed that an engine cutting off at quarter stroke, and driving machinery to the extent of 4-horse power, consumes only 80 lbs. of anthracite coal per working day of 10 hours, a result sufficiently remarkable, but which is well attested.

The patent on the steam generator was granted Oct. 27, 1868, but a reissue bearing date April 20, 1869, has been obtained. The patent on the improvement in steam engine valve was also granted Oct. 27, 1868, and reissued April 13, 1869. Communications may be addressed "Baxter Wrench Co.," Nos. 23, 25, and 27, Lawrence street, Newark, N. J., where this engine may be seen.

BEET ROOT SUGAR.

No. XI.

TECHNOLOGY.—PART VIII.

CONCLUSION.

WATER SUPPLY.

One of the most important considerations in the choice of a suitable location for a beet root sugar establishment is an abundance of water during the whole period of manufacturing sugar from the beet.

In a factory for the working of 150,000 lbs. of beets the quantity per hour needed, we have computed as follows:

	Pounds.
For the supply of the steam generators	3,000
Washing and pulping	6,000
Defecation	1,000
Milk of lime	100
Filtration	4,000
Bone black washing	6,000
Concentration of juice	73,190
Boiling	19,900
Total per hour	113,190

or 1,882 cubic feet.

This is equal to a delivery of 32·5 lbs. per second, or about half a cubic foot.

In practice, it would be safe to reckon on thirty per cent more than the quantity as here stated.

LABOR AND GENERAL ESTIMATES.

With perhaps the exception of two or three men, no "skilled" labor is required in new beet root sugar works, as most of the operations are of a simple, mechanical nature, which is easily taught to the "greenest" country hands, by a competent superintendent and his overseers.

The only skilled hands really needed are an engineer, an hydraulic pump man, a defecator, a sugar boiler, and a bone black burner. Of these, the defecator and sugar boiler it would be best to import from Europe, as the best "sugar refiner," accustomed to cane sirups alone, would not understand the practical difficulties incident to important minutiæ in the special treatment of the juice of the beet.

We here give a general estimate of the cost of labor for a 150,000 per diem factory on the basis of one dollar per shift; of which two take place every 24 hours, the work being continuous day and night.

We have added as a separate item the necessary additions to be made for the extra salaries to be paid to specialists in the various departments. Our calculation is based on a campaign of 100 working days.

I.—WASHING AND PULPING.	
Transportation and washing of the beets. 14 men, 2 shifts per 24 hours, is 2,800 days labor at $1	$2,800
Press department, 28 men, 2 shifts per 24 hours, is 5,600 days at $1	5,600
Sack washing and darning, 8 women, 2 shifts, is 1,600 days at $1	1,600
II.—DEFECATION.	
8 men per 24 hours is 800 days labor at $1	800
III.—SCUMS.	
6 men per 24 hours is 600 days at $1	600
IV.—CARBONATATION.	
250 days at $1	250
Monte-jus	200
Carbonic acid (preparation of)	200
V.—FILTRATION.	
3 men every 24 hours at $1	300
VI.—CONCENTRATION.	
2 men every 24 hours	400
VII.—BOILING.	
2 men every 24 hours	400
VIII.—CRYSTALLIZATION AND CENTRIFUGALS.	
1,500 days labor	1,500
IX.—GENERATION OF STEAM.	
2 shifts of 3 men is 600 days at $1	600
X.—BREAKING AND PACKING.	
5 men per day	500
XI.—MEN IN THE YARDS, ETC.	500
XII.—MANAGEMENT.	
1 general superintendent and 2 overseers	4,000
Bookkeeper and clerk	1,600
XIII.—EXTRAS.	
Carpenter, plumber, smith (3 months)	1,500
Extra pay to skilled laborers	2,500
General total of cost of labor for one year's campaign, in currency	25,850

The quantity of coal consumed by such an establishment as we have described would average 600 tuns, which at $6 per tun would cost $3,600.

The bone black, 30,000 lbs., would cost for the first outlay, at 5 cents per lb., $1,500, but in succeeding years would only amount to replacing of waste

The lime used would amount to 4,500 bushels, and cost about $1,400.

The cost of 15,000,000 lbs. of beet roots to be worked up into sugar would, at $3 per tun, be $22,500.

ANNUAL EXPENSES.

Summing up the above, we calculate that the yearly expenses will amount to:

Labor	$25,850
Coal	3,600
Bone black (waste)	500
Lime	1,400
Purchase of beet roots	22,500
Adding 20 per cent for incidentals	10,570
We have a total of	$64,420
To which has to be added taxes and insurance, which we have computed at	1,945
Interest on capital invested, at 7 per cent	4,793
Making a grand total of	$71,158

FIRST COSTS.

The first outlay for the establishment of machinery, buildings, etc., may be summed up as follows:

Production of steam	$4,480
Washing and pulping	7,274
Defecation	1,420
Scums	640
Sacks, trays, sack washing	3,110
Carbonatation	3,050
Filtration	2,260
Evaporation of juice	10,070
Crystallization and turbines	3,550
Bone black department	1,770
Pipes and cocks	3,600
Packing and unpacking	2,000
Tubs and tanks	200
Brickwork	2,500
Sundries and tools	2,000
Freight on 200 tuns of machinery	1,200
Total, in gold	$49,124
In currency at gold 1·35 it would be	$66,317·40

Adding $10,000 for the erection of the works, and $1,500 for first cost of bone black, we have the sum of $77,817·40 needed for the first establishment in the United States of a manufactory of sugar from beet roots for the produce grown on 500 acres of ground, and which ought to produce at least 1,200,000 lbs. of raw sugar.

REALIZATION.

The products to be realized in our example of a sugar manufactory would be as follows:

Sugar from 15,000,000 lbs. beets, at 8 per cent of sugar, and sugar sold at 12 cents per lb	$144,000
2,700,000 lbs. pulp, calculated at 1 cent per lb	2,700
5,000 gallons molasses at 40° Baume at 25 cents per gallon	1,250
Residues, as fertilizers	1,000
Total	$148,950
Deducting annual expenses and interest as above	71,158
Leaves net annual profit of	77,792

We have every reason to believe that, with careful management, the quantity of sugar obtained in the United States will range as high as 10 per cent instead of 8 per cent, which we have taken as our basis.

In such a case the net income would be $184,900, and the net annual profit $113,742.

No good reason can be assigned why a branch of industry, which, in Europe (although exorbitantly taxed by internal revenue), is considered one of the most profitable investments, should not succeed and prosper in this country, where no tax is levied on beet root sugar, where it is protected by the tariff, and where all other conditions are favorable to its development.

We ought to make ourselves self-supporting in the matter of our sugar supply.

In this case, money-making and independence from foreign supply would be sure to go hand in hand, and the producer and consumer both gainers by it.

We now conclude our long series of articles on beet root sugar. We shall regret neither the space they have occupied in our paper nor the labor we have bestowed on them, if they prove to be the means of stimulating the establishment on a firm basis in the United States of a most important branch of agricultural industry, which must eventually assume an enormous extent on this continent, and which may, before many years, drive foreign sugar from our market.

Oil among the Ancients.

The ancients knew no method of refining oil. As a great luxury they mixed it with perfumes, such as essence of roses and sandal-wood; but this rather detracted from, than added to the burning properties of the liquid, and all that was obtained by the process was an increase of fragrance and a diminution of light. The dwellings of wealthy men like Verres, Mæcenas, and Lucullus, who expended extravagant sums upon scented oils, would not have borne comparison, in point of lighting, with the grimiest tap-room of a gas-lit public house. The gold and silver lamps, hung by slender well-wrought chains to marble pilasters, only yielded at their best a lurid tapering flame, that gave out an enormous deal of smoke, fluttered in the slightest breeze, and went out altogether at a gust of wind. Neither was it possible to steady the light by closing the apertures through which the air came; for, had Roman or Grecian houses been possessed of glass windows, they would soon have become uninhabitable. The fresco paintings of Pompeian villas, the delicate colors on the walls of urban palaces, would, in less than a month, have been hopelessly coated with lamp soot. At the end of an hour's conference of an evening, a party of noble Romans would have resembled a congregation of chimney sweeps. A tunic dyed in Tyrian purple would have acquired a mourning hue in no time.

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ROLLING MILL GEARING.

The heaviest cog-wheels in the world—always excepting Mr. Isherwood's screw steamships—are to be found in iron rolling mills. Nothing at all resembling this gear is to be discovered in flour or cotton mills, or in any other situation on land where steam power is employed. Spur-wheels 18 ft. to 25 ft. in diameter, 24 in. wide on the face, and 8 in. or 9 in. pitch, are not uncommon; while pitches of 6 in. and widths of 18 in. and 20 in. may be met with in almost any little rolling mill we can enter. The quantity of gearing employed in driving an ordinary rail or forge train is even more remarkable than its dimensions. First, we have a tremendous spur-wheel on the engine shaft, working into a pinion on the fly-wheel shaft, which gears again into a spur-wheel, on the shaft of which is a square end to take the coupling-box and breaking-spindle to the rolls. We have, in this arrangement, three spur-wheels and six bearings, all of the largest and heaviest class; and this, be it observed, is rather a simple mill than otherwise. When a hammer, a shears, and a second train have to be driven, we generally find as much gearing as would fill a good-sized modern dwelling-house, running at a high velocity, for the most part badly put to work, and, therefore, noisy and liable to accident. It is not too much to say, in fine, that at least one-half of the whole power developed is expended in keeping this gearing in motion; while its first cost represents one-half the capital invested in the plant of any iron mill.

It is worth while, under such circumstances, to consider whether gearing may or may not be dispensed with; and whether we can or cannot improve upon arrangements admittedly objectionable if tested by comparison with other mills. In dealing with the subject, we must first ascertain why gearing is used at all. This point is soon settled. The velocity at which ordinary trains run varies between 40 revolutions per minute for sheet mills and 100 revolutions per minute for bar or rail mills. Higher and lower velocities are met with, no doubt, but the two which we have named are those most usually adopted, and all that we shall say on this subject just now, will be sufficiently illustrated by cases afforded by those two speeds. Now the work to be done in rolling iron is excessively variable, and it is, therefore, necessary to employ great fly-wheel power, in order to store up force at one time, sufficient to carry the bar, rail, or sheet, through the rolls at another. Without going into mathematics, we may state here that the force afforded by any fly wheel for overcoming the resistance offered to the rolls of a train, varies as the square of the number of revolutions, the weights being the same. Thus, a fly wheel running at 80 revolutions per minute, would be practically four times as efficient as one similar in all respects, and running at 40 revolutions. Therefore, it has come to be looked on as an axiom by rolling mill engineers, that the fly wheel cannot be run too fast. As a consequence, in old works, we always find it put on a second-motion shaft, never on the engine shaft. In the endeavor to obtain high fly wheel speed, we find the first cause for the introduction of gearing in rolling mills.

The second reason lies in the fact that until a few years back, slow moving engines of great size were alone employed to drive sheet and rail trains. These engines had a long stroke, and ran at but eighteen or twenty revolutions per minute. This being too slow for any but blooming rolls, gearing became a necessity. The enormous dimension usually imparted to rolling mill gearing, is explained by the fact that it is exposed to many shocks and jerks which are peculiar to the work which it performs, and that for the most part it is roughly and cheaply made, and carelessly put together. We have, we believe, given in the foregoing paragraphs, every valid reason which can be alleged in favor of the use of clumsy, heavy, costly gearing in rolling mills. It remains to be seen whether these reasons are or are not incontrovertible.

Taking the last phase of the question first, we may state that during the last few years better materials, better proportions, and superior workmanship have been introduced by many makers, such as Claridge, North & Co., and others, with a view to keep down the weight of mill gearing, and with much success, especially in Staffordshire; and it is, beyond question that still more may be done in this direction. But it is quite in another way that we must look for radical improvement. We must begin at the fountain head, and instead of heavy, lumbering, slow working engines, resort to the use of machines making a fair number of revolutions without an excessive piston speed. A good deal has already been done in this direction, we are happy to say. At Woolwich arsenal the splendid bar mill is driven direct at some 60 revolutions per minute by a horizontal engine. In this case power is stored up in one of the finest fly wheels in England, weighing 50 tuns. The sheet train of the Warrington Wire Iron Company is driven direct by an engine fitted with a 60-tun fly wheel. These great weights are rendered necessary by the comparatively slow speed of the trains. When velocities of 100 revolutions are attained a 20-tun wheel will answer every purpose. As an illustration we may cite the Pendleton works, near Manchester, where a 16-in. rail mill is driven direct at 100 revolutions per minute, by a horizontal engine with a 26-in. cylinder and 4 ft. 6 in. stroke. This engine has been running constantly for the last fifteen years, with few or no repairs. The advantage of this system cannot be over-estimated. The cost of a great mass of heavy gearing is saved; the price of the engine is not nearly that of a larger and slower running machine; the chances of breakdowns are reduced to a minimum; and the expense of repairs, wear and tear, and lubrication, is obviously very greatly diminished.

When, as in sheet mills, the rolls run too slowly to permit the engine to be coupled direct to them with advantage, the best plan will still be to use a small engine, running at some 70 or 80 revolutions per minute, and carrying on its shaft a spur-pinion gearing into a spur-wheel on a second-motion shaft driving the rolls direct; we thus retain a high velocity in the fly-wheel and a cheap engine, although some of the disadvantages connected with the use of gearing, unavoidably remain.

The gearing at present usually employed in reversing mills consists of no fewer than five huge spur-wheels and pinions, beside the clutch-boxes. The entire arrangement is simply a barbarous relic of the past. Reversing mills should be driven by small, high-speed coupled engines, without fly wheels, and fitted with a link motion. The first cost is not greater than that of the normal arrangement, while the waste of power and the chances of derangement are greatly reduced. Those who wish to realize what can be done in this direction, should see for themselves engines and mills designed by Mr. Ramsbottom for Crewe, and others manufactured by Messrs. Tennant, Walker & Co., of Leeds, for America.

The above is from the *Engineer*. There are many mills in this country to which these criticisms apply. But the greater number of our *rail* mills have engines coupled directly to the trains—vertical engines, too, which take up the least room. And, for work no heavier than rails, our three high mill is a vast improvement on the reversing mill. Indeed, with proper lifting gear, it is probably better for the heaviest work, such as 15 in. beams. In some of the new English rail mills, two or even four trains are connected to a single engine by no end of cog-wheels.

We can copy the English practice with advantage in many cases; but in the matter of rail mills, our neighbors should study our practice, for instance at Reading, where they would see three 23-inch 3-high trains, driven each by its own direct vertical engine, at 60 to 80 revolutions; at Harrisburg, where a 40 in. by 60 in. direct vertical engine drives a 24-in. 3-high *steel* train, four rolls long, at 60 revolutions; and at Johnstown, where a similar engine, with a 60-tun fly wheel, drives, direct, a 21 in. puddle train five rolls long, and two squeezers. —*Van Nostrand's Engineering Magazine.*

Relative Merits of Wire Ropes and Chains for Hoisting Ores.

Mr. Warrington Smith, in his lectures at the Royal School of Mines, in London, thus discusses the relative merits of wire ropes, hempen ropes, and chains for hoisting ores: "As regards size and strength, these vary considerably. When only manual labor is employed, and the weight lifted is, perhaps, not more than 1 cwt., a very light chain or rope would do, but when we come to steam power, and have to lift several tuns at once from great depths, as in the north of England collieries and iron mines, the rope must be of extraordinary strength. The ordinary rope of three strands was used for many centuries, until a practice grew up in the deeper mines of employing flat ropes, which were found to go down and up in an even plane, and more steadily than round ropes, which are constantly twisting about. In 1830, in the Hartz mines, the question of the amount of money swallowed up in the wear and tear of ropes came under discussion, and it was proposed to make the rope of iron wire, which was then largely tried not only there, but in other parts of Europe, although at first there was great prejudice felt by the men against it. They like a good thick rope, which was very natural, for in travelling up and down these great depths men did not fancy trusting their lives to a little rope not thicker than their thumbs. They were, however, found to be consistent with great economy. They were made of three strands, with a very slight amount of twist, each strand containing a greater or less number of wires. After a while the ropes were made round, with a hempen core, but as in use they were found to have a great deal of torsion, beside not wearing well, in consequence of their not being well looked after and cared for in passing through the shafts, and thus the wire became apt to break, so that you might often see a rope with pieces of wire projecting from it. Whenever this was seen it became high time either to condemn the rope altogether as useless, or to have the shaft examined at the places where it came into contact with the rope, to prevent further damage. In collieries the ropes are carefully protected from coming into contact with the side, and they last very well. The advantages of wire are very considerable. The prime cost is not much less, but a given weight of wire-rope will support a much greater burden than a hempen rope will, so that when an engine is taxed to the utmost, and can only raise a small amount of mineral, the adoption of wire rope would enable it to raise more. Another substance used for ropes, with a considerable advantage, is the fiber of the American aloe, used largely in France and Belgium. At the Grand Hornu some observations were made in order to test its usefulness. At one of the shafts there (No. 8), 355 meters deep, where four tubs are raised at a time, the rope is flat, made of aloe, and consists of six ropes, of three strands each, bound together; this did excellent work, and compared favorably in durability and efficiency with ropes made of other materials. It is usual to make the ropes taper, because the lower end has the weight to sustain all through the operation, while the upper part passes round a drum, and so has a less proportion of weight to sustain.

Chains are frequently employed, and in metalliferous mines perhaps more than anything else. They are mostly single-linked chains, and differ considerably in weight per fathom. In collieries they are largely employed, even to a depth of 450 yards, and the men are lowered to and from their work by this means. It is, however, a dangerous thing to trust men's lives to a single-linked chain, as a flaw in the iron or a bad joint might produce the most fatal consequences, and of late the practice has been very much discontinued, except, perhaps, in the Cornish mines, although it is not uncommon for tolerably new chains to break in a sudden and unexpected manner. Chains are very useful in metalliferous mines, because they may be easily twisted and turned round sharp corners, which is not the case with ropes, which, when large and strong, have a great amount of rigidity. If chains are used they ought to be made of the best charcoal iron, no matter what the cost may be, and care should be taken that the maker is a careful man, and understands the nature of his work. A good chain-maker is a person who deserves high pay, because a great amount of responsibility rests on him. Chains, also, ought to be frequently overhauled, brought up out of the pit, well washed, and every link carefully examined, which, if it were done more frequently and more systematically, would keep down the number of accidents considerably. In some districts, to obviate the danger of sudden fractures, a compound instead of a single-link chain is used, and occasionally a stub of wood is driven through every alternate link to prevent kinks when it passes round the drum.

Although the wire rope has a great superiority over the ordinary hempen rope or chains, it requires to be used with great caution, for if it be turned over a barrel of too small a diameter, it will not last long, and may snap very suddenly. This makes it, as a rule, inapplicable to windlass works in metalliferous mining, or, indeed, in the coal fields, where the operations are preliminary, and only conducted for the purpose of searching. A wire rope never ought to be carried over a windlass or pulley of less than 3 ft. in diameter, and when the rope is of great strength, not less than 6 ft. This, therefore, puts the employment of wire-rope with a windlass quite out of the question, as no ordinary windlass has the requisite diameter. Where, however, special arrangements are made, and a drum of 3 ft. diameter is adopted, it may be used, and I could mention examples in which the wire rope has done good service under those circumstances. For instance, in Austria, at a certain pit, 47 fms. deep, where two drums were used, the smaller of which was 32 in., experiments were made, and without going into particulars as to time of filling, etc., the amount raised by one man in seven hours was 1,269,634 foot-lbs., or 3,141 per minute, by the second 1,175,411 foot-lbs., or 2,902 per minute, which, reduced to the usual standard, will give results considerably in excess of those laid down by most authors, and, as you will remember, of Professor Weisbach, who gives 2,448, and Mr. Walker, the late President of the Institute of Civil Engineers, who gives 2,640. Exceptionable kinds of windlasses are sometimes devised to meet peculiar circumstances; as, for instance, in the extraction of the brown coal obtained in the south of France they use windlasses at which four men can work at once. Perhaps, however, there is no nation which understands the use of the windlass better than Spain, as in the mountainous parts of their mining districts they have no water power available. Indeed, water has frequently to be carried by mules up to the mines for the use of the men. The amount of work performed by the windlass there is very large, the apparatus being contrived on a large scale, so as to employ four men in turning it. There is only one other exceptional kind of windlass that I need mention, and that is where in some foreign countries, in slate quarries, the drum is turned into a sort of treadwheel, with steps put on the side upon which men walk. The capstan is not much used, except in particular districts. Considering the great extent to which this apparatus is used, and the great attention paid to many of its details, it is rather wonderful that no better means have been devised for the safety of the men who are lowered and drawn up in these workings. Their lives hang upon a mere thread, and, to say nothing of the rope breaking, any accident to men at the windlass would let the kibble, tub, or bucket go with a run to the bottom. In the north of England, however, they do use a clevis or spring hook, so as to prevent the possibility of accidents of this kind.

A Valuable Scientific Museum Destroyed.

The St. Louis Academy of Science has recently suffered the loss by fire of its valuable collection of books, pamphlets, maps, etc. The museum contained six hundred specimens of marine shells, donated by the Smithsonian Institute, and was unusually rich in crania, skeletons of birds, and reptiles, together with Dr. Pope's mounted skeletons of mammals, purchased in Europe and transported at great expense; also about 1,200 specimens of minerals, embracing a full suit of Missouri minerals and ores. There were also an extensive collection of the bones and teeth of extinct animals, and fossil turtles collected from the Mauvais Terre, Dakota, by Prof. Hayden; also the collection of rocks, illustrating various geological periods, amounting to four or five hundred specimens, including those collected by Dr. Wizlizenus during Colonel Doniphan's expedition to New Mexico.

Beside the above, there were any quantity of Indian relics and curiosities, including a birch bark canoe; also the specimens of porcelain, collected from a porcelain tower blown up by the China rebels, and presented to the Academy by Lieut. Clarke, United States Navy. All were destroyed, a loss which is irreparable.

FREE TRADE.—It is believed by many of our most careful thinkers that the present unsatisfactory financial condition of the country grows chiefly out of our excessive foreign importations. At the present rate the imports for the year will exceed the exports by more than $100,000,000, which difference must be made up in coin or its equivalent. This seems to be a plain matter of fact, and one that all can understand. Our present tariff, although rating very high, brings us in debt to foreign nations a hundred millions per annum. Now what would be the effect if we should adopt the principle of free trade? It seems to us that our country would soon be filled with foreign goods at prices far below the cost of their production here. Result—prostrate manufacture, idle hands, dull market towns, poor farmers, and a general stagnation. In other words, free trade means destruction to home industry.

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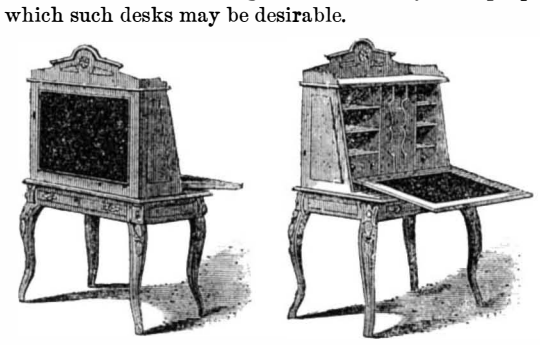
THE LEVERING PATENT DESK.

One of the characteristics of the present age, is the constant effort to improve the articles in daily use in our dwellings and offices, and to add to our household conveniences and facilities for the transaction of business. The writing desk has received its full share of attention from inventors, but the idea of rendering its upper surface a means of something more than mere support for documents, and a plane on which to write, seems to have been heretofore somewhat overlooked.

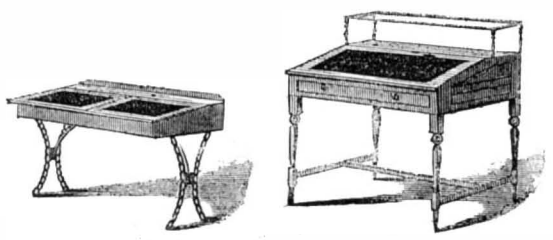
The object of this invention is to combine the advantages of the smooth top with those of a surface which will, at the same time, answer the purpose of a slate or blackboard, on which temporary writing and figuring may be performed with the ordinary crayon or slate pencil.

The feature of this invention which has been made the subject of patent, is the adaptation of a slate surface to the tops of desks, for schools, counting rooms, or for any other purpose for which such desks may be desirable.



For schools the use of this desk obviates the breaking of slates and the expense of replacement, and what is a still more important consideration, obviates much of the noise in schoolrooms attending the use of loose slates, and the marring of the tops of ordinary desks by the attrition of slate frames.

The illustrations we give of different patterns of this desk, show them to be tasteful in design, and also exhibit fully the application of the improvement.



The composition used is equal in hardness and smoothness to the stone slate, while at the same time they retain figures better. The latter are however, readily removed by a damp cloth or sponge. These desks have been introduced into some counting rooms in this city, and we understand give good satisfaction.

In commercial schools and colleges, they would be of special service, as they can be used with great advantage in teaching writing and book-keeping. For mechanics who frequently wish to draw temporary plans they are also very useful.

Two patents have been obtained on this desk, and a reissue is now pending. The surface may be made of stone slate as well as composition, but the composition is more convenient to apply, and is considered superior in other respects.

Manufacturers and dealers in school and counting-house furniture would do well to give attention to this improvement. The inventor, Mr. W. W. Levering, may be addressed, at 35 and 37 Park Place, New York city, and he is ready to negotiate with parties desirous to obtain rights to manufacture.

Patent Office Affairs.

Commissioner Fisher has given his decision in the case of the Heck thread dressing patent, an extension of which was asked. The application was rejected on the ground that the invention was not new at the time the original patent was applied for, and that the patent should never have been issued.

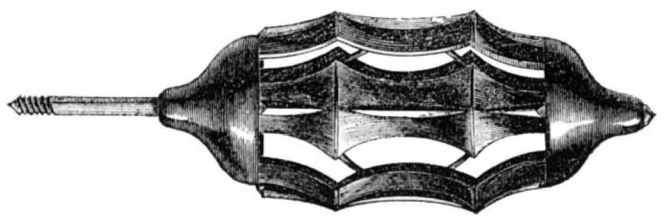
Extension have been granted in the following cases: Stevens, Crosby, and Pearson, of Boston, for a seed planter. Thomas J. Silsby, administrator of Arad Woodruff, of Boston, for improvement in machinery for spinning, and to Thomas J. Knapp, for an adjustable tenoning tool.

The senior member of the Board of Examiners-in-chief, Mr. Hodges, who acts as Commissioner in the absence of that officer, has heard the argument and given his decision upon the following application for extensions of patents: Jacob A. Connover, of New York, for a wood-splitting machine; George W. Brown, of Galesburg, Illinois, for a corn planter. Mr. Hodges in both cases granted the extensions prayed for. The Commissioner having been employed as counsel in lawsuits in which these parties were interested, left the office temporarily in the charge of Mr. Hodges, while these parties were before it. It was from parties interested in the latter case that the telegram was sent to Senator Trumbull to prevent Colonel Fisher's confirmation, stating that he was employed as counsel in five cases involving several millions of dollars.

F. W. Ritter has been promoted from a clerkship to Second Assistant Examiner, and assigned to Professor Hedrick's class of chemicals, and James Lupton, of Ohio, has been appointed second class clerk. Peter Nodine has been appointed machinist and superintendent of the model room, vice Cornelius Jacobs, removed.

PRATT'S ELASTIC BOILER-TUBE SCRAPER.

As the engineering public is gradually becoming educated to the realization of the economy of keeping boilers clean, a considerable number of devices have been patented to meet the demand for a good tool to clean out flues. Brushes have been tried, but the deposit which forms in flues needs something more powerful than them for its effectual removal. We last week illustrated an improved boiler flue scraper, and this week we lay before our readers a description and engraving of another device for the same purpose, the invention of Mr. E. L. Pratt, deceased, late of Beverly, Mass., a patent for which was granted to H. L. Pratt, administrator, May 11, 1869.



This scraper consists of two tapering heads, the broad parts of each facing the other, fixed upon a pipe or rod at a short distance from each other. The broad ends of the heads have mortise-like recesses formed in them, which receive the ends of the cutters; the mortises being large enough to admit considerable play of the cutters to and from the longitudinal axis of the instrument. Each of the cutters has two cutting edges at right angles with its longitudinal axis, so arranged that any part of the surface, omitted by the forward one, shall be scraped by the other. These are also contracted in the middle into a shape approximating the section of an hour-glass, so that all the soot falls into the central part of the instrument between the cutters, and is drawn out with it. The cutters are pressed out against the sides of the flues by elliptical plate springs, which also permit the scraper to enter and clean flues of various sizes. The cutters are to be made of chilled iron which will render them very durable. From the cutting edges of the cutters extend, toward each head, ribs which facilitate the entrance of the instrument; and they also have a central rib extending between the cutting edges, which facilitates the entering of the hinder cutting edges, while it is sufficiently depressed not to interfere in the least with their operation.

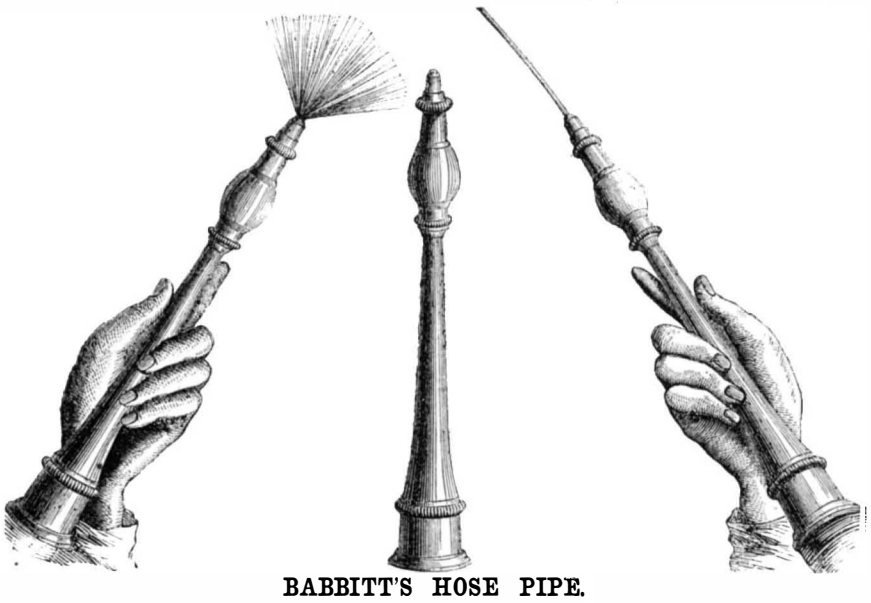
The scraper is so cheaply made that it is designed to furnish them for every diameter of tube, and in such case, the cutting edges are made to fit the curvature of the interior surface of the flue.

It is claimed that this scraper is cheaper, more durable, and effective than any form of wire brush.

Orders should be addressed to Miller's Falls Manufacturing Co., 87 Beekman st., New York city.

Improved Hose Pipe.

This hose pipe combines the solid jet, spreader, and stop cock, in one. It is so constructed that by simply turning, with the thumb and forefinger, the milled nut near the small end, the jet is either entirely checked or diffused in drops, as with the ordinary sprinkler, or fine like mist, so that the most delicate plant may be watered by it without injury.



BABBITT'S HOSE PIPE.

It is simple and compact, and perfectly easy to operate. We have used one of these hose pipes and find it very satisfactory. For florists it is the very thing wanted. Arrangements have been made to supply hose dealers throughout the United States. For particulars address the patentee, F. S. Babbitt, Taunton, Mass.

How Granite is Affected by Fire.

There are few people having any connection with the building trade in this country but have an idea of the strength and durability of granite, its excellent qualities for the general purposes to which stone is adapted, rendering it of almost universal utility. Granite is composed of mica, quartz, and felspar, and its quality is easily discovered by the proportion and arrangement of these; but sometimes traces of other minerals are visible, and influence its density and color proportionately. Geologists accept it as an igneous rock, from the fact of its unstratified condition and the perfection of its crystals, which seem not to have been worn by friction as others are that are found in sedimentary formations. Another peculiarity that it possesses is the quality of indurating or hardening other bodies with which it comes in contact, and this renders it a superior stone for house-building purposes. It is well known that granite walls, if properly built, need no supplementary linings to make them damp-proof, and that mortar will adhere to them and "set" in a manner similar to that which it does when applied to brick. It must not be thought, however, that this peculiarity arises from either porosity or absorption, for experiments have proved that granite is as dense and impervious to moisture as any stone that we possess, except basalt, and consequently its indurating property must be the result of something else—probably, as far as mortar is concerned, of evaporation caused by the latent heat of the stone, such as all pyrogenous bodies are known to possess. But, to be more practical with the subject, we will refer to Wilkinson's experiments on the different varieties of building stone—experiments that were conducted with an amount of care and exactness that leaves little room for doubt as to the accuracy of their results. The average weight of granite he sets down as 170 lbs. per cubic foot, and the quantity of water that it absorbs by immersion about ¼ lb. per cubic foot. The weight of limestone per cubic foot and the quantity of water that it absorbs, he sets down similarly.

Now, from this it is apparent that it is not by absorption that granite maintains dryness, but rather by some other influence that it exercises; for limestone and it being bulk for bulk of equal weights and equal absorbing tendencies, it might naturally be expected that their damp-resisting qualities would also be equal. Such is not the case, however; for while moisture is unnoticeable on the granite, it appears plentifully on the limestone, or exudes through the plaster in case it is covered, although both stones may be subjected to the same weather influences.

As a fire-resisting stone, granite ranks medium, and, like calp, the inferior qualities are the best adapted to this purpose. In many parts of Ireland where it can be obtained, and where bricks are not available, it is used for lining lime kilns—a requirement for which it has been found very suitable. It sometimes, too, supplies the place of fire lumps in the backing of kitchen grates and in lining ovens, and in such positions answers very well.

The harder descriptions yield soonest to the influence of fire, as they "break up" into more regular portions than the softer kind, which rather undergo a wasting process by disintegration.

It may be well here to observe that, unlike the generality of building stones, granite will hold together firmly, even though it may be severely fractured. The friction of its component parts, supplemented by the toughness of its mica, acts with a degree of power that requires the exertion of considerable force to effect separation, and this, although its cohesive properties are completely destroyed. The general fractures by fire are vertical, and in nearly all cases parallel to the face, but sometimes they traverse the face in different directions, the change chiefly depending on the quality of the stone and the direction of its mica.

The granite that we noticed in Messrs. Meade's concerns after the fire was the coping of the wall between their premises and the railway station. The stone is of medium quality. Its projection on that side in contact with the fire was carried off in a line with the face of the wall, but other than this it did not exhibit symptoms of yielding that could be called serious, although at times during the fire the flames completely enveloped it.

In Messrs. Barrington's concerns, too, in Kings'-Inns street, where a terrible fire occurred some years ago, the granite piers and copings withstood the intensity of the heat without sustaining injury beyond the chipping of some projections, and the injury here, as in the former case, we believe to be the result of a reaction, caused by the water coming in contact with the intensely-heated stones. The opinion on this matter is strongly supported by the fact that in the lining of lime kilns, where granite is submitted to violent heat for considerable periods, it exhibits tolerably fair resisting qualities, never yielding in mass, and but slowly by disintegration.

We, therefore, look upon it as a material that may with safety be used in structures intended for fire-proof purposes. —*Irish Builder.*

W. W. CORCORAN, a retired banker, has conveyed to a Board of Trustees, the Corcoran Art Building in Washington, to be held in perpetuity as a free picture gallery. The property is a very valuable one, and Mr. Corcoran proposes to endow the gallery with a cash gift of three hundred thousand dollars. August Belmont, of this city, is going to give a dozen of the most valuable pictures from his private collection as his contribution. Mr. Corcoran's gift aggregates something like one million dollars, and places him among those to be forever spoken of as great public benefactors. It is a noble thing, and, if the money is judiciously expended, the collection will become a source of deep interest and instruction to all classes of our citizens who are able to see it.

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SKINNING AND STUFFING OF SMALL QUADRUPEDS.

In a recent article we gave directions for the skinning and stuffing of birds. We will now supplement those directions with information necessary to enable the amateur to skin, stuff, and mount small quadrupeds.

The directions for stopping the flow of blood, etc., are to be observed as with birds, but it is advisable to thrust cotton into the nostrils, mouth, and vents of small quadrupeds to prevent the efflux of any discharge which is likely to occur, particularly if the animal has been feeding freely not long before it was shot. As fine shot should be used as is consistent with success in the hunting of such animals, for reasons which are obvious.

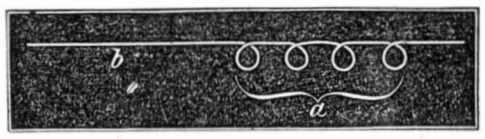
The skinning is begun by making a longitudinal incision between the hind legs, extending quite back to the vent, the hair having previously been carefully parted so that it may not be cut. Care should be taken to only cut through the skin, and not cut into the abdominal cavity. The skin can now be separated from the flesh and turned back as far as the thigh, which is now severed at the joint. When this is done on both sides, the gut should be drawn out and severed a short distance from the vent. The tail should also be disjointed at the root. This being done, the skin can be loosened around the body until the fore legs are reached, when they should also be dissevered. The skinning now proceeds along the neck till the skull is reached. Here considerable care is necessary to remove the skin without damage to ears, eyelids, and lips. The skin is left attached to the skull after the skinning has proceeded far enough to expose the muscles of the jaws, and must be separated from the body at the first joint of the neck. The tongue, eyes, and muscles remaining attached to the head, are now to be carefully removed, and the brain taken out from an opening in the back of the skull cut through for that purpose. To make this opening amateurs can use a small gimlet or bit, with very small animals and a larger one as circumstances may demand. The legs are now to be skinned out quite down to the claws, which completes the operation of skinning.

During the entire process all fluids escaping must be immediately soaked up with cotton. As soon as the skin is removed it should be thoroughly rubbed with arsenical soap, not omitting the inside of the skull and the mouth cavities.

The method of stuffing is conducted on similar principles to that described for birds, but there is rather more difficulty in replacing the facial muscles. For this purpose a pair of slender-jawed pliers will be found very convenient.

We copy verbatim from the *American Naturalist*, the following directions for mounting the skin of a small animal like a squirrel.

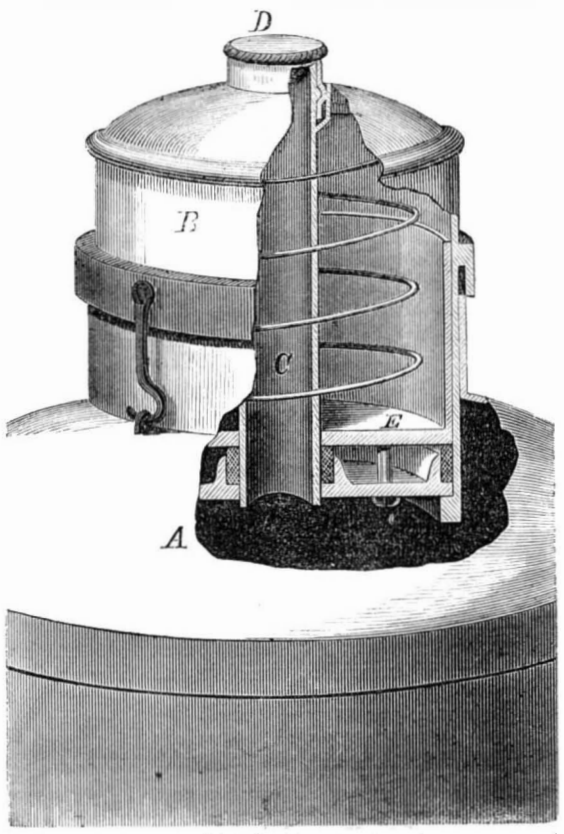
"Provide yourself with cotton, thread, and twine; also the stuffing forceps, a pair of pincers, file, and wire cutters. With the aid of the forceps supply the various muscles of the face and head, by inserting cotton both through the mouth and eyelids. Take annealed wire of the proper size, and cut from the coil six pieces: No. 1, two or three inches longer than



the total length of the body; Nos. 2 and 3 for the forelegs; Nos. 4 and 5 for the hind legs; each of these should be two, or even three inches longer than the limbs they are to support; No. 6, for a support to the tail, of the same proportionate length as the others. With a large pair of scissors, cut fine a quantity of tow, and with this, and the aid of the long forceps, stuff the neck to its natural dimensions. Taking wire No. 1, bend in it four small rings, the distance between the two outer representing the length of the body taken from the skin, *a*, leaving one long end for a support to the head and neck, *b*. Mold tow about that part containing the rings, and by winding it down with thread, form an artificial body, resembling in form and size the natural one taken from the skin. Sharpen the projecting end to a fine point with the file, and insert it up through the cut tow in the neck, and thence through the skull; the skin should then be pulled over the body. Wires, Nos. 2 and 3, should then be placed in position, by inserting them through the soles of the feet, up within the skin of the leg, and through the body of tow, until they appear upon the opposite side. With the pincers bend over the end of each, forming a hook; the wires must then be pulled backwards, thus fastening the hooks firmly into the body. The loose skin of the limbs should then be stuffed with cut tow, taking care to imitate the muscles of the living subject. Nos. 4 and 5 can be fixed in position after the same manner, unless the animal is to rest entirely upon its tarsi (as in the case with the squirrel when feeding), then the wire must be inserted at the tarsal joint instead of the sole of the foot. If any depressions appear in the skin they must be stuffed out with the cut tow. Wire No. 6 should now be inserted at the tip of the tail, and forced down within the skin, hooking it into the body in the same manner as the leg wires. Stuff the tail to its proper dimensions with cut tow, and carefully sew up the incision along the abdomen. Having prepared a board about three-quarters of an inch thick, pierce in it two holes at a proper distance apart for the reception of the leg wires (four holes would be needed if the animal were to stand upon all extremities), these must be drawn through upon the under side until the feet of the specimen rest close upon the upper surface, then they should be clinched, taking care that the wire does not protrude above the surface of the board as it renders the support unsteady. The different joints of the limbs can now be imitated by bending the wire at the proper points; also, a curve can be given to the back, and the tail can be set into proper position by simply bending the wires into the required shape. The eyes should now be placed in their position, a little putty having been previously inserted within the eyelid to serve as a cement. Care should be taken in arranging the eyelid, for the expression depends altogether upon this point. Clip off any superfluous wire which may extend above the head with the wire cutters. The specimen should be placed in some locality free from moisture and allowed to dry thoroughly, when it is complete for the cabinet."

BURGHARDT'S IMPROVED MILK CAN STOPPLE.

In the transportation of milk to market and its delivery to consumers, much of it is badly injured, especially in hot weather, by the breaking of the butter vesicles, so that the fluid is in an intermediate state between pure fresh milk and butter. This is occasioned by the jolting to which it is subjected, an operation analogous to churning. It is evident, therefore, if the milk can be kept motionless it would be as fresh at the end of its journey as when first put into the can. In the device herewith illustrated this is very ingeneously accomplished. In place of the usual stopple, or cover, there is put on the can, A, a cylindrical cap, B, that is secured to the



top of the can by means of hooks, as seen, or any similar device, a joint being made by a rubber ring seated in the cylinder. In the center of the cap is a tube, C, closed at the top by a cap, D, fastened with snugs and inclined channels similar to the method for securing the lamp in an ordinary lantern. This tube is open at the ends, forming direct communication with the interior of the can. A piston, E, fits closely the interior of the cylinder and the exterior of the pipe and is kept down by a spiral spring inside the cylinder.

When the can is filled, the cylinder is secured to the can and then milk enough poured into the tube, C, to fill it to the top. The bottom of the piston bears on the surface of the milk and the spring resists the tendency of the milk, when jolted to move. The utility of the improvement is evident.

Patent pending through the Scientific American Patent Agency. Further particulars may be obtained by addressing J. M. Burghardt, Great Barrington, Mass.

Patent Office Decisions.

Commissioner Fisher has given his decision in the interference case between the applications of S. M. Clark, late of the printing division of the Treasury, and A. C. Fletcher, of New York city. The only question to be decided was that of priority of invention, both of the parties having invented a self-canceling stamp, and, so far as any evidence is shown, without any knowledge of the other's labors.

He has also given his opinion in the interference case of White and Purdy for a box opener, giving the patent to White. In this case two neighbors claim to be the original inventors of the same tool.

Arguments on the celebrated Harmann and Gilmore millstone dressing machine interference case was heard on Tuesday, the 18th of May. This is a very interesting case, and has excited considerable attention from inventors and others interested in patents; not so much on account of the direct interest as upon the side issues incidentally involved.

In 1863, or thereabout, John T. Gilmore, of Painesville, Ohio, obtained a patent for his machine, but did not push its introduction to any great extent. In 1867, one Gooley applied for and obtained through some oversight of the office a patent for precisely the same thing. The patent, upon coming before the courts, was set aside by Judge Olin, a year or two since.

Before the issue was made, Gooley had sold his patent to a gentleman from London for $130,000, and $40,000 had been paid upon it. In order to make himself whole in the matter this gentleman induced Hermann, a Frenchman, to apply for a patent in this country for his French patent taken out in France in 1854. Some changes were made in the machine, and in its new form it was submitted to the Office for a patent. An interference was declared, and the case came before Commissioner Fisher upon a question of priority of invention, and a claim that the machine patented by Harmann and that by Gilmore were unlike. Without closely scrutinizing the other questions, the Commissioner rejected the application of Harmann on the ground that his invention was in "public and common use" in this country prior to his application for a patent from the United States.

Upon the appeal of S. W. Adwen, of Rochester, N. Y., who applied for a patent for a mode of baling hay and straw, Commissioner Fisher has reversed the decision of the Board of Examiners, and ordered a patent to be issued.

Telegraph Lines and the Aurora Borealis.

Mr. George B. Prescott, well-known as an electrician and author of valuable works on the telegraph, makes the following interesting explanation of a phenomenon noted in the case of the recent auroral display:

"On the evening of the 15th of April a magnetic storm of unusual force prevailed over the entire northern section of the country, which so seriously affected the operation of the wires that, on some circuits, they could only be worked by taking off the batteries and employing the auroral current instead. The effect of this great disturbance of the earth's magnetism was manifested with particular power upon the wires between New York and Boston, and for several hours the lines upon this route depended entirely upon this abnormal power for their working current. During the prevalence of this storm, however, I operated upon two wires between the above cities by a plan which rendered them as free from the effects of these earth currents as a local circuit.

Every one has observed that the auroral current comes in waves of ever-changing polarity, corresponding in length and direction with the scintillations of the visible aurora. Sometimes these waves continue but a few seconds, and sometimes for a longer time, but their constant change of polarity prevents the successful operation of a wire, because at one moment the auroral wave may augment the strength of current on the line, while at the next it entirely neutralizes it. Therefore, it has frequently been found advisable to remove the batteries entirely and work with the auroral current alone. But the operation of the lines in this manner is very unsatisfactory, owing to the uncertain and fitful character of this force; and, therefore, any feasible plan by which the wires may be worked under such circumstances is worthy of adoption.

"The plan by which I overcome the difficulties arising from the disturbance of the earth's magnetism was by disconnecting two wires from the earth at Boston, and connecting them together, while I grounded them both at New York, thus forming a loop extending from New York to Boston. As the two wires were both upon the same supports, the auroral wave traveled over each in the same direction, and, by uniting the two wires at one end, the auroral influence upon one wire was made to neutralize that upon the other, and thus the wires were left entirely free.

"Of course it makes no difference how often the polarity of the auroral current changes, or how much the strength of this current may vary, since the direction of the current, and its strength, change as much upon one wire as the other, and therefore the current upon one always exactly equals and neutralizes the other."

Recipes for Colored Potters' Glazings.

WHITE GLAZING.—Prepare an intimate mixture of four parts of massicot, two parts of tin ashes, three fragments of crystal glass, and one-half part of sea salt. The mixture is suffered to melt in earthen-ware vessels, when the liquid flux may be made use of.

YELLOW GLAZING.—Take equal parts of massicot, red lead, and sulphuret of antimony. Calcine the mixture and reduce it again to powder, add then two parts of pure sand, and one and a-half parts of salt. Melt the whole.

GREEN GLAZING.—Two parts of sand, three parts massicot, one part of salt and copper scales, according to the shade to be produced. The mixture is melted as directed above.

VIOLET GLAZING.—One part of massicot, three parts of sand one of smalt, and one-eighth part of black oxide of manganese.

BLUE GLAZING.—White sand and massicot, equal parts, one-third part of blue smalt.

BLACK GLAZING.—Two parts of black oxide of manganese, one of smalt, one and a-half of burned quartz, and one and a-half of massicot.

BROWN GLAZING.—One part of fragments of green bottle glass, one of manganese, and two parts of lead glass.

The Phelan Prize Billiard Cue.

We have had the gratification of personally examining this cue, with which the public have been made more or less acquainted through the daily press, and which was won by Mr. John Deery, at the grand billiard tournament held in this city and closing on May 10th. It is valued at $600, and was designed by Mr. Phelan, of the firm of Phelan & Collender, billiard table manufacturers in this city, and is a very beautiful piece of workmanship. It is of ivory, tipped by a large and beautiful diamond, with handle mounted with gold, mother-of-pearl, and valuable jewels. The fortunate winner will be more fortunate still if he succeeds in keeping it against all contestants.

THE underground railroad bill has been revivified by the Legislature. The charter is in the hands of responsible men and we trust that this important work may be carried forward without delay. The corporators are allowed two years to begin the construction of the tunnel, and are to have three years thereafter in which to complete it to the Harlem River.

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The Materials of the Universe.

A great part of the magnificence of spectrum analysis consists in the extent of its application. Not bounded by the system to which we belong, it carries out its gaze to the utmost limit where light is manifested in sufficient quantity to be comprehended in its grasp. And therefore it would only be a natural consequence of our achievement in solar discovery that those remoter strongholds of mystery should be assailed in turn. Too much, of course, ought not to be expected in the result of a proceeding of such extreme delicacy, and requiring such intense exertion of vision. We have to deal with no glowing disk, no golden shield displaying at once its blazonry but with points, which the highest effort of the most powerful telescope can invest with no true dimensions; whose apparent magnitude is but an illusion—where light is all. But that light, because it is light, shall be made to tell us of its origin; and if it speaks but in a whisper, that whisper shall bear an interpretation of wonder. And what is that interpretation? It will not lead us to "doubt that the stars are fire," flaming with intrinsic, not visible by reflected light; for their mere aspect, combined with their extreme apparent minuteness, has already excluded that doubt. It will not announce to us as a discovery that they are suns; for such would be the natural inference of any one who considered that, at a sufficient distance from the eye, our sun must necessarily be dwarfed into a star. But it will tell us this fact, utterly undemonstrable in any other way, that those suns are so far identical in chemical constitution with our own, that they have the spectrum of solid or fluid incandescence, interrupted by the bars of developed and reabsorbed light given out by volatilized elementary matter—that they are so far similar as to contain many of the same elementary lines—that they are so far dissimilar as to exhibit bands corresponding neither with solar nor terrestrial elements and indicating materials utterly unknown and inconceivable. That interpretation tells us, too, how in certain stars the incandescent gases seem to give out their brilliant lines unreversed by traversing a cooler external shell; and how, in one case at least, a temporary blazing out of light depended upon an actual ignition of a vast volume of hydrogen; it was for the time "a star on fire." Nor is that all. There are, irregularly dispersed throughout the heavens, small patches of a misty aspect, a great proportion of which are proved by the use of powerful telescopes to consist of densely compacted aggregations of extremely minute stars; while others, by their obstinate resistance to this mode of analysis, and the "milky," or to use an artist's term, "sponged out" character of their light indicate some other constitution. Little had that constitution been suspected before the spectroscope of Huggins applied the decisive test. Long ago, indeed, the bold speculations of Sir W. Herschel and Laplace had ascribed to them the combination of mist and fire, and viewed in them the embryo state of future suns and their dependent planetary systems—an hypothesis as captivating to the imagination of some, as unsatisfactory to the mental habits of others. But, whether acceptable or displeasing, this is not so. At a subsequent epoch, indeed, that "nebular theory" had been viewed, with less favour, in consequence of the overstraining of a plausible analogy. So many of these cloudy masses, once deemed "irresolvable," had given way before the recent increase of optical power, that it was not unreasonably inferred that instrumental deficiency alone prevented a similar analysis in every case. Yet appearances were occasionally against that inference, and this time appearances were right. The spectroscope has taken up the investigation where the telescope could carry it on no longer, and pronounces the nature of many of those bodies to be truly that of a fiery mist, composed, however, not, as had been fancied, of all the uncondensed materials of a future sun and planets, but of a very few gaseous elements, whose insulation in space and incandescent condition, can never cease to be a source of amazement.—*Frazer's Magazine.*

The Power of Attention.

In proportion to a man's power of attention will be the success with which his labor is rewarded. All commencement is difficult, and this is more especially true of intellectual effort. When we turn for the first time our view upon any given object, a hundred other things still retain possession of our thoughts. Our imagination and our memory, to which we must resort for materials with which to illustrate and enliven our new study, accord us their aid unwillingly, indeed, only by compulsion. But if we are vigorous enough to pursue our course in spite of obstacles, every step as we advance will be found easier, the mind becomes more animated and energetic, the distractions gradually diminish, the attention is more exclusively concentrated upon its object, the kindred ideas flow with greater freedom and abundance, and afford an easier selection of what is suitable for illustration.

And so the difference between an ordinary mind and the mind of Newton consists principally in this, that the one is capable of a more continuous attention than the other—that a Newton is able, without fatigue, to connect inference with inference in one long series toward a determinate end; while the man of inferior capacity is soon obliged to break or let fall the thread which he has begun to spin. This is, in fact, what Sir Isaac, with equal modesty and shrewdness, himself admitted. To one who complimented him on his genius, he replied that if he had made any discoveries it was owing more to patient attention than to any other talent. Like Newton, Descartes also arrogated nothing to the force of his intellect; what he had accomplished more than other men, he attributed to the superiority of his method. Nay, genius itself has been analyzed by the shrewdest observers into a higher capacity of attention. "Genius," says Helvetius, "is nothing but a continued attention." "Genius," says Buffon, "is only a protracted patience." "In the exact sciences, at least," says Cuvier, "it is the patience of a sound intellect, when invincible, which truly constitutes genius." And Chesterfield has also observed that "the power of applying an attention, steady and undissipated, to a single object, is the sure mark of a superior genius."—*Sir William Hamilton.*

Important Experiments with Heavy Guns.

The London *Times* gives the following interesting summary of the results of recent experiments with heavy guns at Woolwich:

"One pattern of the Woolwich coiled wrought-iron gun endured 400 rounds with ordinary service charges of 30 pounds, English large-grain cannon powder, and 714 rounds with battering charge of 43 pounds; in all 1,114 rounds—a test far beyond anything that such a gun could probably be called upon to resist even during a great war. The gun remains perfectly serviceable. The gun and its ammunition were calculated for each other, regard being had both to power, endurance, weight and cost; and that there may be no mistake as to the powers of the Woolwich 9-inch gun with battering charges of 43 pounds, we give the *maximum* penetrations which the gun is capable of effecting, as laid down by the Committee on Fortifications: into earth 40 feet, into concrete 12 feet, into brickwork 12 feet, into rubble masonry 8 feet, massive granite 2 feet (but with fracturing and disintegrating effect to a much greater depth and over a considerable area), into iron plating 11 inches.

"The second gun fired 400 rounds with 30-pound charges, and 649 with 43-pound charges—1,049 rounds in all. During the firing of the 400 30-pound charges, and during 207 of the 43-pounds charges, the vent was in rear of the usual place. The last 442 rounds with 43 pounds were fired through a vent, in the ordinary service position, which is more severe upon the gun. The piece is now unserviceable, but became so by a most gradual and easily watched process. About 200 rounds before the end of the trial, a flaw was detected in the steel tube. It developed gradually, though the steel barrel is tightly gripped by the wrought-iron exterior, up to the 1,002d round, when gas was discovered escaping from the indicator hole—a small orifice bored in all our heavy guns to give notice when a steel tube is cracked through. The proof was continued with full battering charges, until, at the 1,049th round, the steel tube shifted forward about two inches, and closed the vent, so that further firing became impossible. Thus, though the gun is unserviceable, it has stood an enormous test, and yielded slowly at last, step by step."

Spectacles.

With most persons, there is an epoch in life when the eyes become slightly flattened. It arises, probably from a diminished activity of the secreting vessels. The consequence is that the globe is not kept quite as completely distended with fluids as in youth and middle age. There is thus an elongated axis of vision. A book is held further off to be read. Finally, becoming more flattened by the same inactivity within, the difficulty is met by putting on convex glasses. This is the waning vision of age. If, however, when that advancing imperfection is first realized, the individual persists in the attempt to keep the book in the old focus of vision—even if he reads under perplexing disadvantages, never relaxing, but perseveringly proceeding just as he did when his eyes were in the meridians of their perfection, the slack vessels will at last come up to his assistance, and the original focal distance will be re-established.

This statement will unquestionably be combated, energetically, by those who use glasses. But it will be a waste of forensic powder, because the fact is established beyond cavil. We do not pretend it will be successful in every instance; but generally, if glasses are once resorted to, then the opportunity of doing without them is forever lost.

Very aged men may be noticed reading fine print; and ladies, too, by scores, who resisted glasses at the age of life referred to who enjoy all the comfort of distinct vision, and they will, until, like the deacon's chaise, every stick in the vehicle falls to pieces at the same time.

Therefore, begin with a firm resolution never to use glasses of any kind, for reading or writing. The ancients knew nothing about such contrivances; if they had, there would have been poor eyes in abundance, and oculists to meet the emergency. Cicero never complained of imperfect vision at the age of sixty-three. He even wrote his last letter by torchlight, on the eve of being put to death by the waiting soldiers. Humboldt died at ninety-two, having never been embarrassed with those modern contrivances, lunettes. John Quincy Adams, illustrious for scholarship, at a ripe old age saw without them. Indeed, it would be a laborious enterprise to collect a catalogue of names in the chronicle of literary fame, of men and women, who were independent of glasses.—*Dr. J. V. C. Smith.*

Patents.

Those wishing to secure patents can save themselves much time and trouble by applying direct to Munn & Co., of New York. They have now been engaged in this business twenty-five years, and have the most extensive facilities for obtaining patents in the world. Their establishment is literally a patent office of itself, and, as we have had several dealings with them, we can speak advisedly of their promptness in putting through any business intrusted to them. About one-third of the entire number of applications filed at the Patent Office in Washington pass through their hands, and their charges are very reasonable, while they are very accommodating in advising as to the probability of obtaining a patent, where there is any likelihood of infringement, before allowing the applicant to incur any expense. They publish a pamphlet giving full instruction as to the mode of applying for patents, which is sent free by mail; and they are also well known as the editors of SCIENTIFIC AMERICAN, a paper devoted exclusively to new inventions and scientific subjects, which has had, for many years, a large circulation throughout the United States, and which is recognized as the highest authority on all such subjects. Their corps of specification writers and counselors are made up from the ranks of the Patent Office, and are fully posted as to the merits of new inventions, from practical experience, obtained while examiners there, and they make no charge for advice before receiving applications for patents.—*Galveston Daily News.*

On the Substitution of Sodium for Phosphorus in Lucifer Matches.

Dr. H. Fleck, of Dresden, has instituted a series of experiments with the view to obtain a non-poisonous paste for application to lucifer matches. He ascertained, by some preliminary experiments, that sodium, when minutely divided along with explosive substances, becomes highly inflammable when simply moistened with water. A mixture, constituted according to the formula—

$$(KO,NO_5)+Na+2C=(KO,CO_2+NaO,CO_2)+N,$$

formed a grayish-colored mass, which, on being touched with a moistened glass rod, ignited like gunpowder; this mixture was, however, found to be unfit to ignite ordinary brimstone matches for a cotton wick soaked in petroleum. In order to mend this defect, black sulphuret of antimony was substituted for the charcoal, according to the formula—

$$3(KO,NO_5)+Na+(SbS_3)=NaO,SbO_5)+3(KO,SO_3)+3N,$$

and the mixture made up of—

0·5	grammes of	sodium	= 4·65 per cent.
66·0	"	nitrate of potash . . .	=61·39 "
36·5	"	sulphide of antimony .	=33·96 "

Provided that during its manufacture this mixture is kept thoroughly dry, it has been found to answer admirably well. The mode of making it up is briefly as follows: Pure solid paraffine is put into a well-stopped glass flask, and melted over a sand bath; when fluid, clean pieces of sodium are added, and liquefied under the paraffine. As soon as the metal is thoroughly liquefied, the flask is closed and shaken for about ten minutes, which has the effect of granulating the metal, or rather reducing it to a fine powder. The metal is then poured out of the flask along with the paraffine, and the sodium taken out of the paraffine by means of a clean dry spoon; from 30 to 35 per cent of paraffine remains adhering to the metal; this, however, does not impair its inflammability, while it tends to preserve the metal.

Owing to this increase, instead of 5 grammes, 6·6 grammes of the metallic powder thus obtained must be weighed off. The incorporation with the other ingredients, previously well dried and warm, is effected under petroleum in metallic mortars, but each of the substances is first mixed with some petroleum, and pulverized separately before being triturated with the sodium; instead of gum or glue, caoutchouc, previously soaked in light petroleum oil at 110 deg. C. for ten or twelve hours, is used as mass to form an adhesive paste with the other materials. According to several accounts from Germany, this plan of substituting sodium for phosphorus has been favorably taken up by some of the largest and leading manufacturers of lucifer and fusee matches. There is said to be not the least danger in the transport.—*Deutsche Industrie Zeitung.*

Ocean Telegraphy.

Ocean telegraphy, says Morgan's *Trade Journal*, has made good progress. Before the end of the summer we shall, in all probability, have another transatlantic cable laid—the one from Brest to the French island of St. Pierre, and then on to a convenient landing place on the coast of the United States, not far from Boston. Again, a project to extend telegraphic communication from Cuba (already in connection with Florida) by Porto Rico through the West India Island, is favorably entertained. Prussia, too, we hear, is beginning to think of securing more direct communication with America. It has been suggested that if a cable were laid from a point on her seaboard round by the north of Scotland and by the western shore of Ireland, to join the Anglo-American cables at Valentia, Prussia would send all the North of Europe messages by this route.

It is understood that the Prussian Government have had the subject recently before them, and that a concession has been granted to carry out an Atlantic cable, having North Germany for its termini. The old project of the North Atlantic is being again mooted. That route was to go by Iceland, Greenland, and so on to Canada and the United States, Denmark being the assumed starting point. The cable to India by the Red Sea is going on satisfactorily, and an auxiliary line—one between Marseilles and Malta—is spoken of.

All these projects indicate increased convenience and gain to the public. At present the use of the ocean telegraph is confined to the commercial community; but ere long, when the tariff is reduced from Europe to America and to India, the general public will send messages as freely as they do by the land wires. We may reasonably hope, too, that the cost of submarine cables will be reduced by-and-by, and this will do more to cheapen messages than anything else. Gutta-percha and india-rubber have had a very good time of it. Can we not get some other material, natural or artificial, that will serve as well as either of them?

DEODORIZER FOR EARTH CLOSETS.—J. S. Kelly, of White Plains, N. Y., notices approvingly our article upon the value of earth closets, and considers it a subject of great importance. Mr. Kelly recommends dried peat as the most powerful absorbent of decomposing organic matter. Being composed entirely of vegetable matter it takes up the ammoniacal vapors, which cannot be thoroughly done by earth.

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Correspondence.

The Editors are no responsible for the Opinions expressed by their Correspondents.

Expanded Steam.

MESSRS. EDITORS:—In your issue of May 15th, your correspondent from Keokuk further criticises the cards published by the Wood & Mann Steam Engine Company, and conveys the idea that the engine at Elmira he refers to was one of the same class of engine built by this company. This company have never sold any engines at that point, and from his description he could not have referred to a Corliss Engine, or any other first-class cut-off, and the one he speaks of was undoubtedly some engine claimed as a cut-off; but we will venture the assertion that were the facts thoroughly understood it would be found to be a puppet-valve engine, or some other throttling valve gear, imperfectly made, and proportioned with insufficient fly wheel, and also to have other serious defects, such as no first-class builder understanding cut-off engines would have adopted.

It seems we failed to get at the precise meaning of his previous article, and it suggests the importance, especially on subjects of a scientific nature, of carefully measuring the signification of words used in discussion.

When your correspondent wrote, "No such card could have been taken from any engine," he referred, it appears, to the deductions made from the card, and not to the card itself. The correctness of the deductions we are prepared to maintain, but can only reiterate the statements we have already made. Why steam at 60 lbs., expanding 16 times, showed 3 lbs. terminal pressure on that card was owing to re-evaporation and to leakage of steam valve. That kind of valve has, on that account, since been discarded, and a Corliss valve substituted.

The indicator does not gage the actual amount of steam used, for it does not in whole or part register the loss due to condensation, leakage, etc. Of these it takes no note, but it does give an insight into the working condition of an engine obtainable in no other way.

One point your correspondent makes is this: When the steam valve opens after the piston begins its forward movement, why does the entering steam line on a card fall forward, compression having apparently ceased? This I cannot explain, but believe negative lead always produces that effect on a diagram. Perhaps some of your readers, familiar with indicator cards can explain why.

Regarding the relative value of the "country engine," and the "short cut-off," it seems to us that any theory, after long years of practical success, ceases to be a theory, and becomes an established fact.

We humbly submit that the practical value of highly expanded steam as a motor, is, in 1869, an established fact.

HOWARD ROGERS.

Utica, N. Y.

The Use in Conjunction of Boilers of Different Sizes and Patterns.

MESSRS. EDITORS:—It is often the case that boilers of different sizes and patterns are used together, and being set on same level is always thought sufficient to secure a uniform hight of water in them. I have two tubular boilers of different patterns to generate steam for a stationary engine. They are connected together in the steam room by a two-inch pipe and in the water space at bottom of firebox by another pipe. There has always been considerable trouble in keeping the same level of water, or rather a proper level, in both boilers.

The boilers are of the following dimensions:

No. 1. Firebox surface 80 feet; flue surface 513 feet; grate surface 12·3 feet; contents of boiler exclusive of flues and internal firebox 67·8 cubic feet; thus giving somewhat over seven feet of heating surface to one of capacity.

No 2. Firebox surface 75 feet; flue surface 458 feet; grate surface 10·8 feet.

Contents of boiler exclusive as above, 109·3 cubic feet, being not quite five feet of heating surface to one of capacity. No. 2 was fed by a pump attached to stationary engine. No. 1 had an injector. When No. 1 was fired briskly, the injector had to be used to keep water over the crown sheet of No. 1, while No. 2 was too full. The only remedy we had for it was to fire No. 2 very hard and ease up a little on No. 1, a course not always convenient, especially when much steam was needed. Reasoning, that though the gage indicated the same pressure in both boilers, that No. 1 had the advantage, from the greater disparity of heating surface as compared to capacity, I put in a pipe from the front end of firebox of No. 2, and connected it at extreme end of No. 1, thus taking the water driven from No. 1 into No. 2 from its hottest point, and leading it back into the, comparatively, cool part of No. 1. The result was all I anticipated, there is now no trouble in keeping the water at a uniform hight in both boilers, making steam somewhat easier, probably on account of more uniformity in the quantity of water, and possibly on account of a current in and through both boilers. S.

Huntsville, Ala.

How to Calculate Quantity of Water Consumed by a Boiler.

MESSRS. EDITORS:—Will you please answer through the columns of your paper for the benefit of your readers engaged or interested in waterworks, the best method of calculating the quantity of water consumed by a boiler (in all its parts) through the number of square feet of boiler and flues exposed to fire per hour or day. A. B. C.

St. Louis, Mo.

[One half square foot of grate surface is usually estimated as yielding 1-H. P. Of course this rule is not absolute, owing to the different varieties of boilers and their varying merits. 12 square feet of heating surface is 1-H. P. Same remark applies to this rule.

1 cubic foot of water is required to generate 1 pound of steam.

As your object is to ascertain the amount of water used for which payment is to be made, we will add a statement in regard to heating buildings by steam pipes which may be advantageous. We have been to considerable personal trouble to ascertain these facts. In the latitude of New York city, where rooms are heated by steam in pipes running around their sides, the amount of condensation is ·357 (three hundred and fifty-seven one-thousandths) lbs. of water per hour for each square foot of superficial surface exposed. Where the steam passes through a coil (inclosed usually in an ornamental screen) the amount of condensation is ·29 (twenty-nine one-hundredths) of a pound of water per hour. This when the temperature is kept as near 60 deg. as possible. A higher degree greater condensation, and consequent use of water. These estimates are merely averages, as much depends upon exposure of pipes by frequent opening of doors, windows, etc —EDS.

The Bedfordian System of Astronomy---The Explosive Theory of the Origin of the Celestial Bodies.

MESSRS. EDITORS:—There is one great glory in your social compact. Here in England they inquire the length of a man's purse; you the weight of his brain. Here, however grand the invention or great the discovery, unless the discoverer or the inventor can show that he has "blue blood" in his veins, he is sure to be snubbed more or less; and the old story, "Can any good thing come out of Nazareth," is uppermost upon their lips, as well in the scientific as in the religious world.

These remarks are occasioned by the publication, in one of our magazines, *The Student*, of a paper entitled "a New Theory of the Universe," by Mr. Proctor, B.A., F.R.A.S. The fact to which I desire to call your attention is, that this "new theory," as it is called, is a flagrant plagiarism of "New Theories of the Universe," by James Bedford, Ph.D., published in pamphlet form, and entered at Stationers' Hall here in October, 1854—nearly fifteen years ago!

By reference to your file about 15 months since (I have not a copy at hand at the moment) you will see that you have done Dr. Bedford the honor, as well as the justice, to refer to his theories in an article headed, I think, "Relation between Meteors and Comets," and which article I subsequently found quoted in many of the leading journals on this side the Atlantic. A comparison of the "Bedford Theories of the Universe" with the theory published in the *Student* (February, March, and April numbers) and purporting to be Proctor's, will enable your readers to judge to whom the honor belongs of having propounded what is now believed to be the true theory of the Universe.

Had Mr. Proctor quoted Dr. Bedford, it would have been seen that his paper was an able and full amplification and verification of that gentleman's theories. This would have done Mr. Proctor credit, and Dr. Bedford but simple justice.

London, April, 1869. LIBRA.

Phosphorescence of Sugar.

MESSRS. EDITORS:—I have to record what to me is a hitherto unobserved fact.

Late in the evening, a short time ago, I had occasion to step to the cupboard for a lump of sugar. The bowl being empty I went into the next room, in the dark, to the store box, and in breaking off the required piece from the projecting points, I was astonished to see a flash of light start out from the fracture. I first thought it a light from the lamp shining through the opened door, and through some interstice of my clothing. I shut the door and returned it to the box, and found the flash strangely repeated at every fracturing touch I gave the mass. The sugar was a white coffee quality, damp when bought, but had dried hard.

The next day I went to the box, hooding out the light by covering my head and top of the box, but could get no manifestation. The next evening, at the hour of candle-lighting, I repeated the fracturing and found the glowing flash, ample as at first.

I should think it the crystallic "od" light Reichenbach announced some years since, but that it seems to exhibit to all alike of the number I have yet led to it. Can you, or any of your readers, inform me respecting its nature and cause?

Leavenworth, Kansas. A. C. N.

[We can answer our correspondent, first, that the phosphorescence of lumps of dry sugar, when rubbed in the dark, has long been known. The phenomenon may be, however, new to many of our readers, and second, that the odic force of Von Reichenbach is in our opinion a myth. If not a myth it seems odd that other physicists should not have been able to detect it and have corroborated the researches of that celebrated philosopher.—EDS.

Capacity of Boilers.

MESSRS. EDITORS:—I have a tubular boiler, 8 feet long, 17 2¼th-inch flues; boiler 2 feet diameter. Engine, 7-inch bore, 10-inch stroke, in good order, new, and works finely. Driving-wheel 4 feet, runs 150 revolutions per minute, estimated 8-H. P. It drives a 26-inch "Queen of the South" corn-mill pulley on mill spindle 12-inch. I work 80 lbs. steam per steam gage, but can only run my engine 20 to 30 minutes when the steam is at 40 or below. I can get up 80 lbs. steam when the furnace is cold in 50 minutes. I pass my feed water through a heater and convey exhaust steam into smoke pipe 3 feet above the boiler. The smoke pipe is 14-inch diameter and 30 feet long. The draft in the furnace is good, especially when the engine is at work. The boiler is entirely covered with masonry.

If I have stated the case so that you can understand it, please tell me the trouble, and how I can remedy it.

W. C. B.

Louisville, Ala.

[The boiler referred to has about 80 square feet heating surface. Its diameter is too small, and the number of tubes not sufficient to give a good draft. If the engine takes steam the full length of the stroke, it would require a boiler of double the capacity, but if it cuts off at one-third or less, the same boiler should be sufficient.—EDS.

Law of Motion.

MESSRS. EDITORS:—During the last year I have been met so often with the assertion of an "absolute law of motion," before which everything that conflicts with it must give way, that I have been led to give the subject much thought, and have come to the conclusion that the following propositions are true, and would be glad to have them laid before your scientific and mechanical readers that they may state wherein they are not true.

1st. That motion is always a resultant or effect, and never a cause (excepting secondary).

2d. That a resultant or effect can have no law of its own.

3d. That what are called the laws of motion, are, in all cases, the law of the agent used in producing the motion.

4th. That the only absolute law there can be in regard to motion is "that where you increase motion you decrease power," and this can only be maintained for the simple reason that to assert to the contrary, would be to assert that you can produce an effect without a cause.

5th. That there is no law of motion.

QUERY.—Assuming a law of motion, as asserted, then if it could be caught and caged would it not be perpetual motion, or at least obviate all the objections to perpetual motion.

L. S. F.

Ice-making Machinery Wanted.

MESSRS. EDITORS:—The Frost King slighted us in this latitude last winter, so we are without ice and too far in the interior to get it elsewhere. Will you not favor us with an article in your paper on the subject of artificial ice, indicating what are the best processes and apparatus for making it cheaply and effectively, with the cost of the outfit for making any given quantity, and cost per tun or pound of making it. If you would call upon parties having processes or machinery for making ice effectively and economically, to advertise in your paper, it might result in their interest and the public good. If indeed there are any really practical and valuable methods of making ice artificially. ICE.

Virginia.

Singular Effect of Transmitted Light.

MESSRS. EDITORS.—The object of this communication is to call your attention to a phenomenon which I have observed for the last year, an account of which will perhaps be of interest to your numerous readers. I have in my drug store a bottle of pulverized curcuma (*turmeric*). On the bottle is painted a green ground in the shape of a shield, upon which the name of the contents is painted with black paint. A coating of curcuma adheres to the bottle about 1-16th of an inch in thickness, excepting under where it is painted. Under the green ground, being what painters call transparent, a very thin coat adheres, and under the black letters not a particle is found. If a cast was taken inside the bottle a proper *fac simile* of the shield and lettering would be produced in relief. J. M. SUTTON.

Jacksonville, Oregon.

Sleepy-Hollow Chair.

MESSRS. EDITORS:—I own a cheap but comfortable "Sleepy-Hollow chair," made of pine wood; it is on rollers, which are screwed to the legs; these rollers bothered me a good deal by coming off on account of the softness of the wood. It suggested itself to me, that if the screws were dipped in melted glue it would be an improvement. I did so, and now the rollers are as firm as if the wood to which they are attached had been of the hardest kind. This was at least six months ago. I think the experiment a good one. H. J.

Washington, D. C.

Hot-Air Furnaces as Remedial Agents.

MESSRS. EDITORS:—Had I supposed my opponent would be catching at straws I would have said that my wife was always a feeble woman, and that probably her life has been saved by the beneficial effects of a hot-air furnace.

G. W. H.

Weed Cutter Wanted.

MESSRS. EDITORS:—Could not some of your inventors make a machine for cutting the weeds off ditch banks. Here we have ditches every half acre one way and every five the other, and often times diagonal ones. In old times these ditches were cut by hand four or five times a year; now, for the want of labor, they are either never cut or only once a year, with manifest injury to the crops. A mower in the shape of a traverse plow, with a knife eighteen inches or two feet long, would be the thing.

If there is an instrument in existence for executing such work while the crops are growing, let the maker advertise it. S. R. STEWART.

New River, La.

THE survey of League Island, which has been recently ordered by the Secretary of the Navy, will soon be made. A similar survey will be made of New London, Conn. It will consist of soundings as to the depth of water, and capacity of the places for the construction of navy yards.

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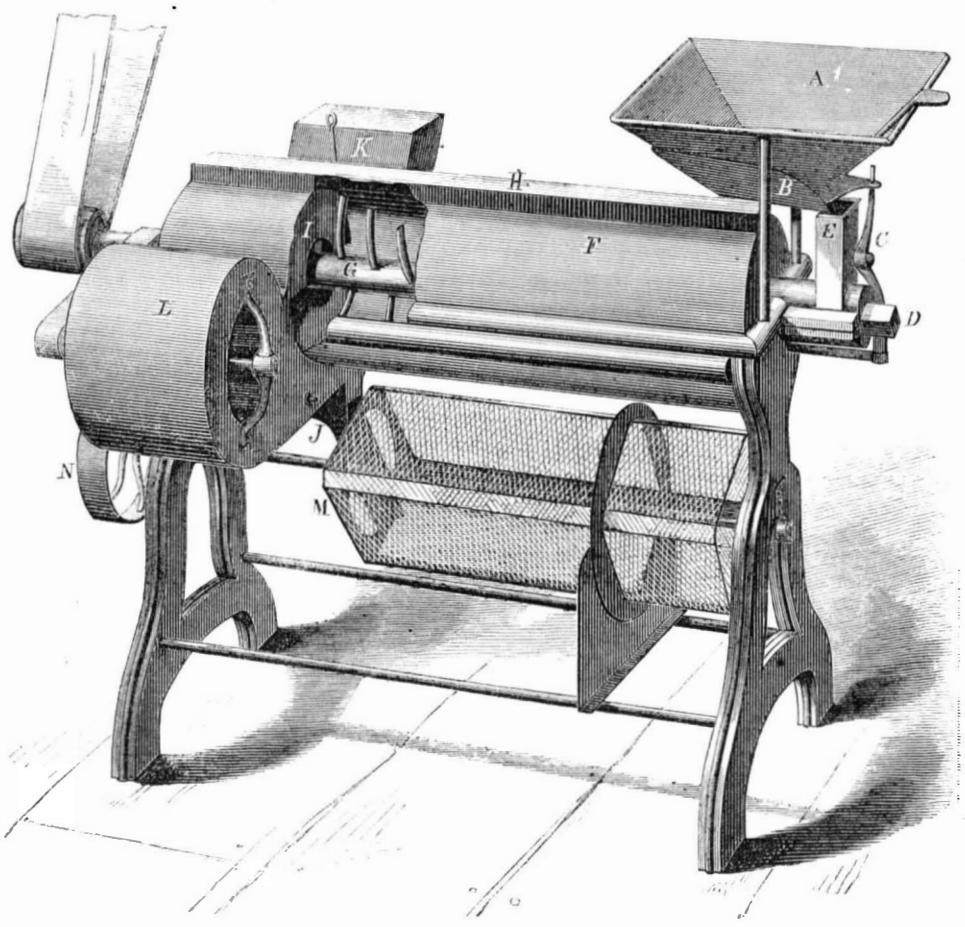
Manufacture of Hominy.

Those of our readers who reside in portions of the country where wheat is the staple, will hardly realize the extent to which Indian corn, prepared as hominy, enters into the food of the inhabitants of large sections of the United States. Not only is it a staple article of diet through most of the Southern States, but it also is in demand, to a less extent, throughout other portions of the country, and considerable quantities are also exported.

We herewith give an engraving and description of a new and improved hominy and pearling mill, invented by E. A. Duer, of Decatur, Ill., which is apparently a very efficient device for the preparation of this important article, as well as the pearling of barley, rice, and other grains.

In the engraving, A represents the hopper, provided with the ordinary shoe, B, which is vibrated by the oscillating bar, C, which is actuated by the knocker, D, attached to the main shaft of the mill.

The grain passes from the shoe into a vertical trough, E, provided at the bottom with a spiral conveyer, attached to the main shaft, which carries it at a uniform rate into the hollow cylinder, F. This cylinder is divided longitudinally and horizontally, so that the upper half, with the hopper supports, etc., may be lifted off as occasion may require. Within it, revolves the main shaft, G, to which are attached knives or beaters, arranged in spiral rows, so as to carry the grain along the cylinder to the end remote from the hopper, at the same time that it is beaten thoroughly by the knives. The cylinder is further provided with a longitudinal recess, H, placed at the top, into which the grain is thrown by the centrifugal force of the revolving shaft and beaters, and the object of which is to arrest the motion of the grain, and bring it repeatedly into violent contact with the knives. The cylinder is further furnished with a diaphragm, I, provided with an opening to allow the grain to pass after being sufficiently beaten. The object of the diaphragm is to prevent the too rapid transit of the grain to subsequent parts of the machine.



DUER'S IMPROVED HOMINY AND PEARLING MILL.

After the grain has passed the diaphragm it falls through a passage, provided with a slotted gate, which serves to regulate its fall toward the curved chute, J. In making this passage it traverses the lower part of an inclined air chamber, K, and is crossed by a current of air generated by revolving fans in the cylinder, L. These fans are attached to a shaft in the same manner as those in an ordinary fanning mill, and receive motion by means of a belt from a pulley on the main shaft. The beaten grain is thus winnowed on its way to the revolving screen, M, which is also driven by a belt from the main shaft running on the pulley, N. The air chamber, K, is provided on the back with a sliding door which serves to regulate the blast and affords exit for the dust and detritus. The elements of this mill are all well-known devices, and can be relied upon to perform their special parts of the work in the manner described. It is said to require only about one-half the power required by other mills, to perform a given amount of work. The arrangements for securing a uniform feed and discharge are praiseworthy features. The hull and chaff are completely separated from the hominy, or other grain, by the action of the parts above described. The machine is quite compact, occupying only about four feet square of floor surface. The knives are made of the best cast steel, and require sharpening only about once in four or five weeks, when the mill is doing full work. The machine has been in practical operation for some time, and the quality of its product is said to be very superior.

The inventor is confident that the regular feed and discharge secured by the arrangements we have described, will secure general favor for this mill. Offers for territory and propositions to manufacture will be considered. The mill was patented, August 4, 1868, through the Scientific American Agency.

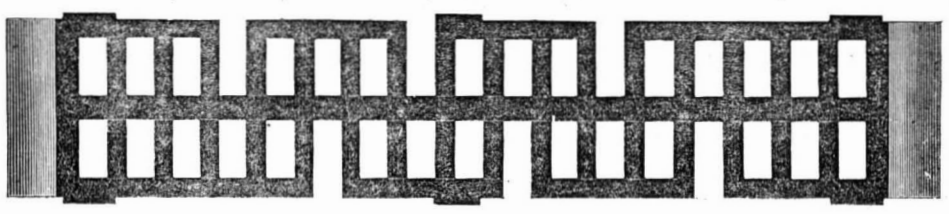
For further particulars, address Geo. W. Patterson, owner of the patent, P.O. Box 957, Decatur, Ill.

Requisites for Good Furnace Grate Bars.

The chief results to be secured in a good grate bar are economy in the use of fuel and durability. A great many patterns for grate bars have failed to secure these results, for want of recognition of the principles upon which they should be constructed in order to insure success. Grates burn out rapidly when too large a portion of their surface is exposed to the direct action of the fire, and too little surface is exposed to the air; and if to secure a large exposure to the cool air they are so made as to obstruct the draft, they fail to give perfect combustion. With such defective grates large quantities of unconsumed gases pass off with the smoke, the effect being to make the furnace, in which such bars are placed, approximate in its action to a gas retort; distillation taking the place of combustion.

All other things being equal, that grate will be the best which opposes the least obstruction to draft, presents the smallest surface to the direct action of the burning fuel, has the largest area in contact with the cold air which enters the furnace, and, at the same time, will withstand the effects of expansion and contraction.

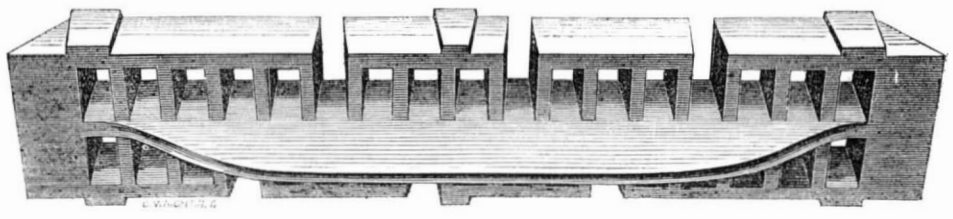
The form of grate bar shown in the engravings seems to cover the entire ground, all of the above principles being taken into full account in its construction. Fig. 1 is a top view, and Fig. 2, a view of the under side, inclined, to show to advantage an important feature of the bar; namely, the great depth of the central portion which projects below the other parts and forms a wide rib.



TUPPER'S FURNACE GRATE BAR.

This feature of course gives great strength, but it performs a still more important office, that of keeping the temperature of the bar at a much lower point, than could be the case without it. The heat from the upper portions is rapidly conducted away by this rib, which is constantly cooled by the influx of cold air from without. Thus is secured one of the main points.

A glance at the plan will show at once that the amount of space for the passage of air through this bar, is unusually large as compared with many other styles of bars; while the portion exposed to the direct action of heat is unusually small. The metal from which these bars are cast is a combination of different irons, which has been found to best withstand the effects of expansion and contraction.



Few claimants to public favor can show a better record than this has accumulated during a test of ten years' use in steamers, stationary engines, locomotives, heating furnaces, etc. The bar has been tried in all places and under all circumstances of severity, and found equal to the test. It is in use in more than 5,000 places, including many of the largest steamships, and many of the most prominent manufacturing establishments in the United States, and its merits are attested by a large number of manufacturers and engineers of high repute. It received the highest premium at the fifth exhibition of the Worcester Co. Mechanics' Association, in Massachusetts, and honorable mention at the Paris Exposition.

We commend this grate bar to the attention of all parties interested. Address all communications to Mr. L. B. Tupper, 120 West st., New York.

A LOTTERY has just been drawn in Vermont, and among the prizes were 8,000 gilt rings, worth half a cent each, and 150 empty flour barrels, while one young man, who held $300 in tickets, drew a blue-edged plate. This is a fair sample of the various lottery schemes that are so frequently palmed off upon the people. They are complete shaves.

Babbitt's Attrition Metal--Directions for Preparing and Fitting.

Melt 4 lbs. of copper, add, by degrees, 12 lbs. best quality Banca tin, 8 lbs. regulus of antimony, and 12 lbs. more of tin while the composition is in a melted state.

After the copper is melted, and 4 or 5 lbs. of tin have been added, the heat should be reduced to a dull red, to prevent oxidation; then add the remainder of the metal as above. In melting the composition, it is better to keep a small quantity of powdered charcoal on the surface of the metal. The above composition is called "hardening." For lining the boxes, take 1 lb. of this hardening and melt it with 2 lbs. of Banca tin, which produces the lining metal for use. Thus the proportions for lining metal are, 4 lbs. of copper, 8 lbs. of regulus of antimony, and 96 lbs. of Banca tin.

The article to be lined, having been cast with a recess for the lining, is to be nicely fitted to a former, which is made of the same shape as the bearing. Drill a hole in the article for the reception of the metal, say a half or three quarters of an inch, according to the size of it. Coat over the part not to be tinned with a clay wash, wet the part to be tinned with alcohol, and sprinkle on it powdered sal-ammoniac; heat it till a fume arise from the sal-ammoniac, and then immerse it in melted Banca tin, taking care not to heat it so that it will oxidize. After the article is tinned, should it have a dark color, sprinkle a little sal-ammoniac on it, which will make it of a bright silver color. Cool it gradually in water, then take the former, to which the article has been fitted, and coat it over with a thin clay wash, and warm it so that it will be perfectly dry; heat the article until the tin begins to melt, lay it on the former and pour in the metal, which should not be so hot as to oxidize, through the drilled hole, giving it a head, so that as it shrinks it will fill up. After it has sufficiently cooled remove the former.

A shorter method may be adopted when the work is light enough to handle quickly; namely, when the article is prepared for tinning, it may be immersed in the lining metal instead of the tin, brushed lightly in order to remove the sal ammoniac from the surface, placed immediately on the former and lined at the same heating.—*The Practical Metal-Worker's Assistant.*

A Drunkard's Cure.

"Some months ago, a gentleman advertised that he had discovered a sure specific for the cure of drunkenness. He would not divulge the secret of what compounds he used, but furnished the medicine at so much per bottle. He did not have so many applicants for cure as he expected, considering the extent of the disease. In fact, the more malignant cases did not seem anxious for relief. They rather appeared to enjoy their malady. A few, however, placed themselves under treatment, and some were cured—whether by taking the medicine or by not taking strong drinks, we are not prepared to say. One of the cured ones had faith in the medicine, rigidly carried out the directions of the doctor, and now has not the least taste for intoxicating drinks; whereas, one year ago, he was an inebriate, and could not get along with less than a pint to a quart of whiskey per day.

"He said that he had, at some trouble and expense, procured the recipe for the preparation of the medicine, which he had published for the benefit of suffering humanity. It is as follows: Sulphate of iron, five grains; peppermint-water, eleven drachms; spirit of nutmeg, one drachm; twice a day. This preparation acts as a tonic and a stimulant, and so partially supplies the place of the accustomed liquor, and prevents that absolute physical and moral prostration that follows a sudden breaking off from the use of stimulating drinks. It is to be taken in quantities equal to an ordinary dram, and as often as the desire for a dram returns. Any druggist can prepare the prescription."

We cut the above from an exchange. The prescription named is, as stated, a tonic and a stimulant; but we consider the dose too large by one-third. Considerable irritation of the stomach might be experienced by some patients from so large an amount of the sulphate. The sulphate should also be of the crystallized form. Apothecaries will understand this, but some people might be tempted to prepare the medicine themselves, and obtain for the purpose the dried salt, which is much stronger. We do not believe it can destroy the appetite for liquor, but it may lessen the cravings for it until the habit of drinking has been broken.

AN experimental test was recently made at the new public library in Cincinnati, of May's system of making buildings fire-proof. An oven had been built up next to the plastering and joist, which had previously been prepared with metallic lath and concrete, and was subjected to an intense heat for eight hours, but without any observable effect. The architect, builder, and some gentlemen of the Board were present, and seemed highly pleased and satisfied with the result.

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IMPROVEMENTS IN THE STEAM ENGINE.

An immense amount of time and money has been expended upon new and ingenious cut-offs for steam engines. Each in its turn, as it was brought before the public, was supposed to excel its predecessors, either in its power of adapting the exact quantity of steam used to the work to be done, or its instantaneous action. The best modern engines show, by the indicator cards, between 60 and 90 per cent of the theoretical effect of the steam; in all cases the figures vary in proportion as care is exercised in keeping the temperature up in the cylinder. All these are improvements, and they tend toward greater economy in the use of steam. Before the steam engine can be called an economical power, our modern system of boilers must be immensely improved, or an entirely new system of applying the heat to the water must be contrived.

We all know that the steam engine is at present a most wasteful source of power, and that we realize only between 15 and 25 per cent of the theoretical amount of power derivable from the coal which is consumed. There is about 75 per cent lost somewhere in the boiler, and it seems as if it would be more important to make the vigorous attempts at improvement upon the boiler rather than upon engine. That which Watt did for the steam engine when he invented the condenser, some engineer of our own time can do by improving the boiler. As it is necessary to apply heat for the generation of steam, and as the boilers of all sea-going steamers must of necessity use salt water, the first improvement should be a better method of abstracting the salt from the water. This is at present performed by the use of surface condensers, but they are large and heavy, and withal do not give perfectly fresh water. This operation should be performed as the water enters the vessel, and before it has passed through the boilers, as in the surface condensation of the present system. As higher pressures and a greater degree of expansion have, so far, proved to be a source of economy, it is probable that we shall see the pressure raised above that which boilers now carry, and as a consequence the steam will be expanded to a greater degree. But before we can arrive at this point, it is necessary that the salt should be extracted from the water before it enters the boiler. What form the boiler may assume is more than any one can say, but so long as the heat is not applied in a better manner, we must lose a large amount. A large quantity of heat is lost by radiation from all parts of the boiler.

It is true we felt the exposed surface, but this is only a method of reducing a loss, which with our present form of boiler we must be subject to. Heat is lost as it travels from the furnace to the uptake, indeed some of the currents of heated gases generated in the furnace scarcely reach any of the surface of the boiler at all, but pass through the center of the tubes out through the smoke pipe, having done no work except to fill up spaces which otherwise would have been left vacant, this loss is greater in proportion as the diameter of the tubes or flues are increased. Where all the losses are, it is impossible to state, for it is most difficult to judge at what point heat is being given off in great quantities; points which we suppose are giving off large amounts may perhaps be wasting but a small percentage of the whole loss.

Watt, when he invented the condenser, made, we might well say, the last great improvement in the steam engine. Since his time the boiler has been changed, tubular boilers have been introduced, and the pressure is far higher than any used in his day. No doubt if Watt had been able to get the pressures in his cylinders as great as we now get them, he would have made use of expansion, fully appreciating its benefits. With the low pressures which prevailed, he carried expansion to its most economical limits. As we look back upon the years past, we see that all the improvements of any magnitude have been made upon the boiler; the improvements in the engine having merely kept up to, and followed closely, the change in the construction of the boiler.

The next great change in the steam engine—the next change that will promote the use of steam and add to its immense utility, will come by improvements in the boiler. We must attack the source of the evil if we wish to overthrow it, and in the faulty construction of the boiler the evil will be found and the difficulty conquered.

WHAT IS PRESSURE? AND WHAT WORK WILL IT ACCOMPLISH?

These are questions suggested by a letter from an esteemed correspondent, who has written us from Australia, in regard to his supposed discovery that pressure will perform work. He describes the method by which he intends to utilize the pressure of the sea upon the bottoms of floating vessels, to propel them without the aid of steam, so indefinitely that we can get no clear idea of the means employed.

The questions, which his letter has suggested as a subject for the present article, are not new; they have been long the subject of thought and discussion, and have been definitely answered. But though it is known to physicists, that pressure, merely, can never perform work, there are many men like our correspondent whose minds are not clear upon the subject, and errors in their views, and mistakes in invention, frequently arise from this cause.

First, what is pressure? A ball of rubber rests upon a table. It does not, regarded as a mass, move relatively to the point of support. If we examine this ball minutely, we shall find that its shape—supposed to be perfectly spherical when no pressure is sustained—is no longer a sphere, but has become a spheroid, whose shorter axis lies on a line drawn through its center and the center of the earth's attraction. If now the support be suddenly lowered away from the ball, pressure either is lessened or annihilated, and the ball, considered as a mass, begins to move; and we find by further experiment, that so long as the conditions of pressure are not altered, no relative motion will take place between the mass and the supporting body; and still further, that when the pressure is lessened, the ball approaches the spherical form, finally attaining that form when all pressure has been removed.

Now, if we approach this subject free from preconceived notions, to observe what has taken place, we find that when mass motion begins to diminish, what we call pressure begins to increase, and when mass motion begins to increase, pressure diminishes. All we have to show for this so-called pressure is change of form. Change of form implies molecular displacement, and molecular displacement implies increased molcular motion; so that, in this case, we have the simple conversion of mass motion into molecular motion. In this view, pressure is simply increased molecular motion, and is synonymous with tension.

Let us now try our experiment with a liquid inclosed in a vertical pipe, with a pressure gage inserted at the bottom. Let the pipe have a funnel at the top, into which water may flow to maintain a given head while the water is flowing through the tube, and an escape pipe to keep it down to the same head when the bottom of the tube is closed. If now the bottom be closed, the pressure gage will show an amount of pressure upon the sides of the pipe corresponding to the hight of the water column. And if the tube be composed of elastic rubber, we shall find that it expands until its resisting force is equal to the pressure upon its walls. If, now, the water be permitted to flow through a tap at the bottom, we shall find the pressure, indicated by the pressure gage, to decrease, while the elastic walls of the tube contract. We have here the same phenomena of diminished pressure, increased motion and change of form, we had in the first experiment.

With gases we also find pressure diminishing in the tubes through which they are conveyed, as motion of the column increased.

So after having examined the three states of matter, solid, liquid, and gaseous, we find that in all observed cases, diminution of mass motion, and increase of pressure are connected, and *vice versa;* while at the same time we find that all we can discover of pressure is a change of form in masses, greater or less as the so-called pressure is greater or less.

Now, whether we regard this change of form as the result of an occult force styled pressure, "*vis mortua*," or anything else we please to call it; or whether we reject the hypothesis of an occult force, and consent to consider pressure and tension as identical, and the representative of molecular motion, does not affect the fundamental truth that pressure, as pressure, never performs work, and that only when it partially or wholly ceases, mass motion, which is capable of being directly applied to work, supervenes. So that if it were possible for our Australian inventor to convert all the pressure which now sustains his vessel upon the surface into mass motion or direct power to perform work, the supporting power would be gone with the pressure, and though his vessel might go ahead, it would also go—to the bottom. Any portion of this pressure converted into motion, is so much subtraction from its supporting power, which is pressure.

The necessity for a more perfect understanding of the fundamental laws of physics on the part of inventors cannot be too strongly urged. The ground upon which nuggets of discovery, so to speak, could be picked up at random, by any one who had eyes, has been mostly explored. There are now no more nuggets. Those who get gold hereafter must mine scientifically, or return with empty pockets.

THE NEW YORK "TIMES" ON NITRO-GLYCERIN.

In the case of Widow Cuff against the Newark and New York Railroad Company, the evidence, given in the Hudson County Supreme Court, shows with what desperate recklessness the nitro-glycerin explosion at Bergen, in 1867, was brought about. Burns, the man in charge of the oil, was drunk and drowsy. Wishing to melt the glycerin, he dipped the can into a vessel of water, and then put a red-hot poker into the water. When he found this had no effect, he took an iron spike and hammered it into one of the cans to break up the frozen mass! Then came the explosion, at last. With proper care nitro-glycerin is as safe as gunpowder, though greatly more powerful.

The paragraph we have quoted is from the New York *Times*, of May 14th. The daily press of this city evidently thinks itself competent to discuss any and all questions, whether of political economy, science, or transcendentalism. But assuming as it does to be the universal instructor of the public, it ought on a subject involving great hazard of human life to speak at least intelligibly, if not intelligently.

What does the last sentence of the above paragraph mean? There is a substance known to chemists called chloride of nitrogen. It is formed by inverting a jar of chlorine gas in a solution of sal-ammoniac, and it floats upon the surface of the solution in oily drops. The circumstances under which this substance is likely to explode are so numerous, and the certainty that they can all be eliminated from an experiment is so difficult of attainment, that the most skillful experimenters hesitate to exhibit even the smallest quantities of it to a class. Even when experimenting with very small quantities, Sir Humphry Davy was wounded in the face by an explosion of this substance, and the celebrated chemist, Dulong, lost an eye, and had a hand maimed for life in an experiment with the same explosive. Yet it is just as true of this substance as of nitro-glycerin, that, with proper care, it is as safe as gunpowder; meaning by proper care, the certain and absolute removal of all circumstances under which an explosion is possible. The explosive itself is perfectly harmless without the circumstances, and the circumstances will never blow people into fragments without the explosive.

The great difficulty with nitro-glycerin is, that sometimes, through ignorance, and at others through heedlessness, proper care is not taken. Even the enforcement of proper care is a matter of difficulty. Leakages occur during transportation, when everything was supposed at the outset to be sound; and divers other accidental circumstances are liable to explode this substance which could not by any possibility render gunpowder unsafe.

That explosive is the safest which will explode under fewest conditions, provided the conditions are such as may be controlled by ordinary means.

The paragraph we have cited seems to convey the impression that in the Bergen disaster the means employed would have exploded almost anything but nitro-glycerin. The man was drunk. Surely, this of itself would have ignited gunpowder. He was drowsy. This would set fire to gun-cotton. He put the can into water. Everybody knows the wonderful igniting power of water upon combustibles. He stuck a hot poker into the water, utterly careless of the extreme inflammability of that liquid. Having failed to ignite this "safe," but powerful explosive, by any of the ordinary means enumerated, never known to fail with any other, this monster of recklessness had resort to an iron spike, an object of such deadly potency, that it can only be obtained by surreptitious means in any civilized country; and with this fell implement he *at last* effected an explosion.

The real facts in the case cited are that the very first agent employed by the unfortunate, and perhaps careless man, who ignited the nitro-glycerin, capable, in the manner he employed it, of producing ignition, did produce it with its awful results; and yet the *Times* makes this absurd attempt to torture the facts into a demonstration that it as "safe as gunpowder." Fie! Fie!

It is just because men do get drunk and drowsy and careless, and that many other unavoidable contingencies are liable to arise, which will explode nitro-glycerin more readily than dynamite and other less powerful explosions, that we deprecate the indiscriminate use of that terrible explosive compound.

A NOBLE INVENTOR.

Invention is confined to no rank or condition of life. The names of statesmen, warriors, divines, authors, merchants, bankers, manufacturers, and mechanics, are to be found enrolled among the benefactors of the race, as inventors and discoverers of new and useful improvements in the arts.

In the course of our professional experience we have frequently been called upon to take out patents for men distinguished for their labors in other departments of life. We were forcibly reminded a few days since of the ubiquitous character of inventors by a visit to our office of a venerable British Peer, the Earl of Mount Cashell, of Moore Park, a gentleman eighty years of age, who, a short time previous to his departure from his home, had employed our services to obtain for him a patent for an improvement in windows. Having a son residing near London, Canada West, his Lordship came over to pay him a visit, and on his return he called on us to inquire about his business. He mentioned the fact that he was a kinsman of the celebrated Lord Rosse, so well known for his scientific attainments and astronomical discoveries, and said that a vein of ingenuity runs through the family; and, furthermore, that he had a number of useful improvements

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which he hoped to live long enough to patent for the benefit of the community. Here is an example of a British nobleman who feels a pride in classifying himself among inventors.

CULTIVATION OF OPIUM IN THE UNITED STATES.

Continued attention is given to the production of this drug in the United States. Recent tests go far to show that the quality of the opium raised in several sections of the country is good.

The editor of the *American Journal of Pharmacy* has made an assay of some laudanum made from Virginia opium, and finds that it equals in strength fair Turkey opium. On the contrary, Vermont opium is condemned as being merely an extract of poppy leaves and stalks, with a little true opium juice, very variable in composition, and wholly unfit to replace the foreign drug except in very large doses.

This defective quality is attributed to the mode of manufacture, described at length in the semi-weekly *Tribune* of March 5th by the inventor. The main features of this process are grinding and pressure, with use of some alcohol to extract the morphine. The juice thus obtained is dried, and then packed for sale. We agree with the *Journal of Pharmacy* that it must be impossible to obtain a good quality of opium by this process, but we are uninformed whether the proper method obtains opium of good quality and in good quantity from poppies grown so far North.

Mr. Robertson, the successful producer in Virginia, states that his experience is very limited, he having only cultivated the poppy in a garden on very rich soil, where the yield of opium was very great; he neither measured the land nor weighed the opium. He is satisfied that a deep rich soil is essential to a large yield; the poppy has a long tap root, which enables it to stand severe drought, provided the tap root can penetrate the soil to a sufficient depth. He thinks alluvial soils are best. The young plant is very tender, of slow growth, and cannot be successfully transplanted. The seed should be put in drills about three feet wide, the plants standing from one foot to eighteen inches apart, or even more, as it is a very vigorous grower. The last of July or early in August is a good time to sow the seed, as the plants stand the winter without injury. The single poppy he found to yield more opium than the double, and there is less trouble in obtaining it from the capsules. The single white poppy, or rather the poppy with white seeds, is generally considered the true opium plant. When the capsules are about half grown, or three or four days after the flower has dropped, is the proper time to make several longitudinal incisions on the capsule, taking care not to cut through the capsule.

The incisions should be made during the latter part of the day, and the thickened juice which exudes during the night scraped off the next morning with a dull knife. When it becomes sufficiently dried it can be put up in any shape or size that is desired.

HOW A WORKINGMAN MAY GET A HOUSE OF HIS OWN.

We have no desire in these remarks to say anything to the injury of those who make building a business, or rather, a speculation. If they have injured their business by shabby methods of building that is their business and not ours. But it is not only our business, but our duty, to point out to workingmen a method whereby they may provide themselves with comfortable dwellings, provided always that they possess habits of economy and skill sufficient to demand the average wages of skilled mechanics in this country.

It is undoubtedly true that no man can now be sure of obtaining any one of the cheaper class of houses in American cities, ranging in price from $1,000 to $5,000, properly constructed, unless he can supervise its erection himself, or has it supervised by some trustworthy agent. If he buys one already built he runs the risk of finding it sadly in want of repair after a few month's occupation. The timber has not been properly seasoned, the walls crack from the settling of the foundations, the roof will perhaps leak, the floors will sag, and repair will be added to repair, only to disappoint the hopes of the deluded purchaser.

It is true that in the best built houses there will be some cracking of the walls and shrinking of joiner work, but these necessary evils are not what we refer to; it is of their exaggeration, consequent upon gross and willful negligence in the erection of such buildings, that we speak. Timber reduced to the smallest size at which it could be expected to bear the strain to which it must be subjected, even if of the best quality, is put in without regard to any other requirement than size; so cross-grained sometimes that we have even seen it split obliquely across from the face of the hammer in nailing, and afterward spliced by strips of thin board nailed on to its sides with *small nails* so that it should not split a second time in the splicing. What matter! The house is made to sell, and if it will appear, when finished, to be well built, and keep up the appearance until sold, it has answered the purpose for which it was built, if not that for which it was bought.

The obvious moral to be drawn from these facts is that those who intend to possess comfortable and substantial houses should have them built for themselves, and thus see that proper materials and proper workmanship are employed. But how is this to be accomplished by men of very small means? "We must rent such houses as are built for us; we cannot build houses for ourselves," say they. "But *you can*," say we. It may take you one, three, or five years to do it, but you can do it, thus:

First, you must obtain a lot. We will say this lot is worth four hundred dollars. By joining a well-managed building lot association, of which many now exist in this country, you will be able to take advantage of the market and perhaps get it cheaper, and, as you will be more likely to save when belonging to such an association, we consider it a good plan to do so. But in order to get the required lot, you must, of course, save something in some way. Two dollars per week for two years, will give you a fund of $408, exclusive of interest, sufficient for the purpose. You can now raise money by mortgaging this property to a savings bank, or you may get help to build your house from a building association, which we believe exists in most large towns. These associations, upon the payment of a small sum weekly, will erect a house for you, taking a mortgage on the entire property as security, so that at the end of four years, or thereabouts, you may live in a house of your own, and the rent you are now paying will pay up the mortgage after a time, leaving you the property unincumbered.

If the property has been well purchased (the aid of such societies as we have described cannot be obtained otherwise), you can probably dispose of the property at a considerable advance on the purchase price at any subsequent period you see fit. In most of our growing cities the first value of your house and lot will have doubled on your hands by the time it is paid for, so that you could at the end of ten years from the time you laid by your first two dollars, realize by the sale of your property a very comfortable sum to have in bank, or to reinvest in business, which would never have been yours if you had paid all in rent to greedy landlords.

These remarks are specially applicable to workingmen in large and growing cities where rents are high, while suburban lots are low, and of easy access by means of horse cars and other facilities of modern travel.

KING-CRABS AND THE MANUFACTURE OF CANCERINE.

The last summer trip it has been our good fortune to snatch from the confinement of journalism, was made at Delaware Bay. The fine shores which skirt this magnificent body of water, are remarkable for the enormous swarms of king-crabs, or, as they are sometimes called, horse-feet, from their fancied resemblance to the foot of a horse, which annually visit them.

They deposit their eggs in the latter part of May, and in June, at which time their numbers are beyond estimation. The shore is strewn, at all seasons, with their shells. "The Geology of New Jersey" states that 100,000 per week have been captured on a shore length of 100 rods; 750,000 have been taken on one-half a mile of shore, and in one year 1,200,000 were taken on about one mile of coast. The same authority says "the number of eggs is very great. They are so thick that they can be shoveled up by the wagon load. Great numbers are thus gathered and carried away to feed chickens. When they hatch, the sand is fairly alive with the little creatures. A year or two since, a vessel took in a load of sand, and in two or three days so many of these young king-crabs appeared in it, that they were obliged to throw the whole overboard."

This animal is found along the whole Atlantic coast, but, for some reason, Delaware Bay seems a favorite resort for them. During the breeding season, no more novel and amusing sight can be exhibited to one not familiar with it, than these creatures coming in on a full tide. The water is one dense mass of teeming life. The imagination is bewildered in the vain attempt to estimate their numbers. In they come, rolling, and tumbling, and climbing, and struggling to reach the shore, and the ebb of the tide leaves large numbers an easy prey. Hogs are extremely fond of king-crabs, and large numbers are caught for that purpose. They are also gathered into pens, where they soon die, and their decayed bodies form an excellent manure. Land, so poor naturally that no wheat could be grown on it, has been so enriched by the application of this compost, that from 25 to 30 bushels to the acre has been produced.

An excellent compost is prepared by mixing the dead bodies of these animals with sawdust, straw, forest leaves, muck, mud, or barn-yard manure, or a mixture of these materials.

In some places their bodies are ground up after being desiccated, put up in bags, and sold as an artificial manure, under the name of "cancerine." Its value, at the works, is about $25 per tun. About eight hundred pounds per acre is the amount applied, and its fertilizing power is estimated as being about equal to half its weight of guano.

An analysis of cancerine, by Mr. Ingham, gives water, 9·32; organic matter, 70·86; lime, 4·35; phosphoric acid, 2·71; sulphuric acid, 5·17; alkaline salts, 3·68; sand, 3·88. The nitrogenous substances contained in cancerine are sufficient for the production of a little over ten per cent of ammonia, although the latter does not exist ready formed in it.

The habits of the king-crab are very imperfectly understood; after the breeding season the live ones disappear, and their place of resort during the interval is not known. It is estimated that if the onslaught annually made upon them, does not permanently reduce their numbers, the production of cancerine can be developed to many thousands of tuns annually.

The New Apothecaries' Act.

The general deprecation of the careless manner in which powerful drugs have hitherto been dispensed, in which we have taken a prominent part, has resulted in calling the attention of our legislators to the subject, and a law has been passed in this State which reads as follows:

SEC. 1. No person employed or in attendance at any drug store or apothecary shop shall prepare a medical prescription, unless he has served two years' apprenticeship in a drug store or is a graduate of a medical college or a college of pharmacy, except under the direct supervision of some person possessing some one of the before-mentioned qualifications; nor shall any one having permanent charge as proprietor, or otherwise, in any store in which drugs are sold by retail, or at which medical prescriptions are put up for sale or use, permit the putting up or preparation thereof therein, by any person, unless such person has served two years as apprentice in a retail drug store, or is a graduate of a medical college or a college of pharmacy.

SEC. 2. Any person violating the provisions of this act shall be deemed guilty of a misdemeanor, and shall be punished by a fine not exceeding $100, or by imprisonment not to exceed six months in the county-jail; and in case of death ensuing from such violations, the person offending shall be deemed guilty of a felony, and be punished by a fine not less than $1,000, nor more than $5,000, or by imprisonment in the State Prison for a term of not less than two years nor more than four years, or by both fine and imprisonment in the discretion of the Court.

SEC. 3. This act shall take effect immediately.

This is good so far as it goes; but in order that the public be properly protected, druggists ought to be made responsible for the character of the patent medicines and nostrums which they are in the habit of vending.

NEW TYPE-SETTING AND DISTRIBUTING MACHINE.

Mr. M. Umstadter, of Norfolk, Va., informs us that he has completed a machine that will justify ten thousand characters per hour, the work being done with far greater exactness than can be found in any printed book. The Norfolk *Virginian*, in speaking of this invention, says respecting it:

Other machines have been invented and put in operation, but the trouble with all has been the want of any appliance for "justifying," or making the lines the same length, with due regard for the space between words and the proper division upon syllables. This has, in every instance heretofore, been done by hand, and thus, as labor-saving implements the previous inventions have been of little value. To obviate this difficulty has been the chief care of the inventor in this instance, and he claims that his machine will set and "justify" as many type in a given space of time as six men. The justification is effected by a space of his own invention, of this shape)(, formed of brass or steel strips riveted together in the middle, and capable of being compressed into one-half of the ordinary thickness.

The machine proper is two feet wide, and thirty inches long, divided into as many compartments as there are different types; into these compartments the types are placed in the proper position, filling the chamber, into which they fit loosely, their own weight keeping them pressed down to the bottom. In front of the machine is a double row of iron keys, lettered to correspond with the chambers of type. By pressing upon one of these keys a type is forced from the bottom of one of the chambers into an iron trough, fitted to the exact thickness of the size of type used, so that when once in the trough or slide it is impossible for it to fall over on its side. Underneath this trough runs a belt, furnished with steel hooks or teeth, and driven by a treddle beneath. These hooks convey the type along the trough to an apparatus at the end of the machine, where they are placed in regular order until a line is full, when the striking of a bell announces the fact to the operator, who, by simply pulling a small lever, places the line in an upright position on a frame.

The machine can be seen at David Morris' establishment, on Union street, where he is busily engaged upon an automatic distributing apparatus to be attached to the machine, when it will be the most perfect invention for the purpose yet brought before the public.

The sample of the work sent to us is very good, but no better than what has been done by other machines for the same purpose.

A Hygienic Ice Chest.

At the last meeting of the Massachusetts Institute of Theology in Boston, Dr. Garrett exhibited and explained what he he called a hygienic ice chest, which he claimed would ventilate a room by means of ice. The apparatus had the form of a secretary, the middle portion containing ice, the lower receptacle for the water from the melting of the ice, and the upper portion containing convenient shelves. He said the coldness of the ice would make a downward draft of air through a slit in the top of the apparatus, and that the air thus cooled and deprived of its moisture would issue from the sides into the apartment, purified and refreshed. He added that the noxious effluvia of the sick room would thus be drawn in upon and condensed by the ice, and remain in the water below. It was not claimed that it supplied any oxygen to or removed carbonic acid from the air of the room, but that it removed unwholesome effluvia.

Mr. Lowe spoke of the hygienic importance of the relative humidity of the air within and out of doors, especially in sickness. This apparatus, by its ice, would make the issuing air drier, and, therefore, more healthful in the dog days, when the damp air is so oppressive. Moist air is the best conductor of odors, and the moisture is lessened by the ice. He thought, however, that the ice should be put in the top and not in the middle portion of the apparatus.

Mr. Duncklee made some remarks on the importance of securing in our dwellings a certain relative humidity, and said that from 40 to 65 per cent is the best, both for sick and well.

Trial of Steam Fire Engines.

At a recent Steam Fire Engine trial, held at Springfield, Ill., the citizens, at the outset, appeared to be prejudiced in favor of the piston engine, as being more simple and capable of more continuous work at a high rate of speed; but the rotary machine seemed to secure friends from the first hour of the trial. On the important points of the time taken in raising steam, and the facility with which a working pressure is maintained, and the capacity for throwing a large amount of water, the rotary demonstrated superiority. The fact that though she threw her water a greater distance than her opponent, the hose and engine remained perfectly still, demonstrates her economy for repairs of machinery and hose. The consumption of fuel in the rotary was also much less.

THE workmen in the Springfield armory, in Massachusetts, have taken steps to form a workingmen's association, to cooperate with similar associations throughout the country on the eight-hour and other questions.

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THE LATE REV. PATRICK BELL, LL.D.

The Rev. Patrick Bell, LL.D., minister of Carmyllie, in the Presbytery of Arbroath, the well-known inventor of the reaping machine, died recently, after almost attaining the Scriptural three score years and ten. He had been ailing for the greater part of a twelvemonth, and for the last four months of his life he had been entirely laid aside from ministerial duty. The celebrity attained by Dr. Bell was entirely due to the successful character of the invention with which his name is henceforth to be indissolubly associated in the history of the country. The father of the deceased was a farmer in Forfarshire; and when young Bell was a student, prosecuting his studies for the ministry at St. Andrew's University, in the year 1827, he turned his attention, on his brother's farm, to the practical application of his views on machine reaping, and in the following year the machine was working successfully. It was then almost as perfect a piece of mechanism as the best reaping machine of the present day. Its invention preceded that of the American machines by seven or eight years. At the Dundee meeting of the British Association, in 1867, Dr. Bell gave a very full and graphic account of the history of the invention. Some time after that meeting, a subscription of £1,000 was collected and presented to Dr. Bell, as a recognition of the great value and utility of his invention, and about the same time he was created L.L.D. by his *alma mater*. Dr. Bell was an excellent mathematical scholar, and fully studied the application of mathematical science to physics.—*Engineering.*

The White-footed or Deer Mouse.

This species of the *Mus* family has been noted for two characteristics, not confined to it alone, but still rare. One is that it is an active tree-climber, and very frequently makes its nest upon or in trees, sometimes at a considerable distance from the ground; and the other is its mode of transporting its young, which, as usually observed, is by the latter adhering to the teat of the mother, who drags them along in her flight from danger.

In October last I observed a bunch of sticks and twigs in a thorn bush, about thirty inches from the ground, about the size of one's head and rounded on the top, with no appearance of ever having been occupied by a bird. When the ax-man struck the root of the tree, a white-footed mouse (*Mus leucopus*) rushed from the nest with two of her young family, fully half-grown, attached to her. She coursed up and down the limbs, and from one limb to another, dragging her heavy load after her. Occasionally both would drop down on either side of the limb along which she was dragging them. Sometimes when she would reach a lateral branch, the young hanging its whole length below it, she would *yank* the infant with a force truly surprising, which must have been a severe test upon the hold of the little one.

Two observations interested me particularly: First, the young were not adhering to the teat, which has been supposed to be the universal habit of this mouse, but were adhering to the outside of the thighs. In this observation I do not think I could have been mistaken, as I was struck with this peculiarity, and stood within a yard of them, and she stopped in plain view several times in apparent doubt as to which way to go, and once on a limb about an inch in diameter, and with one of the young hanging down on either side, which gave me the best possible chance for an accurate observation. The young, though large enough to have fled much faster than the mother could drag them, made no effort to assist in the flight, but contented themselves with passively hanging on. Second, the young were of a dull blue or lead color, darker than the common house-mouse, and showing no white on the feet, belly or sides, which is always observable in the adult.

My desire to secure them as specimens was overcome by my sympathy for the afflicted mother, and I allowed them to escape. This was done after having once retreated to the nest, and left it again upon a new alarm, when she ran out upon a limb as far as she could, and jumped to the ground, a distance of full four feet, the young still adhering to her.

I did not, as I should have done, examine the internal arrangement of the nest. If she had taken possession of an abandoned bird's nest, she had completed the structure by adding to it till the top presented a full convex form.—*J. D. Caton in the American Naturalist.*

The Channel Bridge.

The following is a translation of an article in the *Journal Officiel de l'Empire Francais*:

"The project of a bridge over the Straits makes each day further progress. The first model was completely finished some days ago, and is perfectly satisfactory. This small model is composed of a single arch, reduced upon an exact scale to the hundredth part of the size of one of those of the great bridge. It presents an absolute rigidity throughout; that is to say, it is not subject to any movement or oscillation; there is, consequently, no vibration calculated to disintegrate the metal.

"There is no more elasticity perceptible under foot than in walking on a pavement, and it can support without any deflection, a weight greater than that of twenty trains proportioned to the same scale, meeting in the middle of the arch. The weight of ten men does not produce a deflection of more than a few millimeters in its whole length, and as soon as it is relieved of its burden, it recovers exactly its first position; indeed, it is not necessary to employ several of the parts prepared to ensure rigidity. This result simplifies the question, and permits considerable economy in the cost.

"A second model of a size double that of the first is on the point of being completed, and if, as everything tends to show, the result is as favorable, the most skeptical will be unable to entertain the smallest doubt in respect of it.

"In any case, the problem is solved that bridges and viaducts of every size can be constructed in a single arch, without piers, from bank to bank. Already many orders for large and small bridges have been given—among others, a large bridge for a road and railway of a kilometer in length, which will unite St. Malo and St. Servan to Dinan; a foot bridge of a hundred meters over the basin of the lock at Calais; and several others for the departments."

Apparatus for Saving Life at Sea.

A new contrivance for saving life at sea has been made by M. C. J. Laurendeau, of Paris. It is composed of a quantity of thick cork, sufficient to float and sustain a person in the water, and is adapted to the abdomen and a part of the chest; a second supply of thinner cork is placed between the shoulders, and reaches to the nape of the neck. This arrangement is intended to produce perfect equilibrium, the part of the body unfurnished with cork acting as ballast. Should the bather desire to swim under water, the collar is removed, or the buoyant part turned from the side, the principal piece being furnished with nippers for closing the nostrils and a pipe or tube to breathe through, the end of which terminates in a funnel of cork, so as to float on the surface of the water. And, finally, a person may remain, and swim a considerable time under water, by making the principal piece of the apparatus both a means of buoying up the body and an air reservoir, from which the bather expels and draws in air by means of a double tube, the reservoir being divided into two compartments by an elastic partition; but this apparatus is intended only for good swimmers, and it would be necessary to carry ballast.

Editorial Summary.

HERR GROTOWSKY, of Halle, on the Saale, has made known some interesting facts on a new property of hydrocarbon oils which he has discovered. Exposing various kinds of oils in glass flasks to the rays of the sun for a period of three months he found invariably that they absorbed oxygen and converted it into ozone. The air was ozonized even in well corked vessels, the effect being, however, to some degree dependent upon the color of the glass. The respective results were noted after the lapse of three months. American kerosene, from petroleum, which had been exposed to light in white unwraped glass balloons, had become strongly ozonized so much so that it scarcely burned. The originally bluish white oil had assumed a vivid yellow color, and the specific gravity was found to have increased 0·005. American kerosene which had been kept in the dark for three months did not show any ozone at all, and burned satisfactorily. The oils were exposed from April to July, 1868. Those which had become strongly ozonized had also suffered a distinct change in odor, and the corks were bleached as if attacked by chlorine, while the other oils had remained unchanged in these particulars.

THE EFFECT OF CHARCOAL ON FLOWERS.—A horticulturist in England, purchased a rose bush full of promising buds—the flowers, however, were of a faded hue. He covered the earth in the pot about an inch thick with pulverized charcoal, and was surprised, some days afterward, to find the blooms of a fine lively rose color. He repeated the experiment another season with the same result. He then tried the powdered charcoal upon petunias, and found that both the white and violet colored flowers were equally sensitive to its action. It always gave great vigor to the red or violet colors of the flowers, and the white petunias became veined with red or violet tints; the violets became covered with irregular spots of a bluish or almost black tint. Many persons who admired them thought they were choice new varieties from the seed. Yellow flowers appear to be insensible to the influence of charcoal.

THE new Cab Company Act, which passed the Legislature during the last session, is shortly to go into operation. The company have a capital of a quarter of a million, with power to add one hundred and fifty thousand more, and are authorized to run their cabs or hansoms in any street in New York or Brooklyn that the Mayor of each city may direct. The following rates of fare are provided in the act, and a half fare additional may be demanded between midnight and six o'clock in the morning: "For any distance not exceeding one mile, for a single passenger, 30 cents, and for two persons, 40 cents; and at the same rate for greater distances, a fraction of a mile counting always as a mile. For any time not exceeding one hour, for a single passenger, 75 cents; for two persons, $1; and for any time additional, for each hour, or fractional part of an hour, at the same rate."

CHEAP POSTAGE SYSTEM.—Since the publication on page 315, current volume, of our notice of the abuse of the franking privilege by Hon. John T. Deweese, M. C., of North Carolina, in franking Swetland's circulars, we have had other complaints. It appears from the envelopes before us that Mr. Deweese not only signs his frank, but the superscription appears also to be done in the same hand writing. We could afford to pay a very liberal salary to any "M. C." who is open to do work of that sort. Our yearly postage bills are very large.

DWARF orange trees from China have reached Los Angeles, California, in good condition. "It is curious," says a writer, "to see an orange tree not over two feet high, and filled with blossoms and fruit." An acre of ground would contain over four thousand of such trees, and although each tree would produce not more than a half dozen oranges, yet the yield per acre would largely overbalance that of standard trees. A lot of bamboo plants, of a variety which grows to a hight of thirty feet, and from three to four inches in diameter, have also reached California.

THE Postoffice Department has received a telegram from Promontory Point, stating that the mails have been delivered at that place to the Central Pacific Road, and that the through line has been regularly established. The Butterfield Company were informed that their contract would cease on the junction of the roads. The cost by the Butterfield route for transporting the mails was $1,100 a mile, and by the railroad $200 a mile per annum.

WE desire to call the attention of our readers to the advertisement of the Colwells, Shaw & Willard Manufacturing Company, dealers in Patent Lead Encased Block-tin Pipe, published in another column. This pipe brings one of the purest and most harmless of metals into contact with water used for culinary purposes, instead of the poisonous metal-lead. Its merits are attested by a large number of eminent scientific and practical men.

FISH.—William Church, of Seymour, Conn., is engaged in pisciculture, and estimates that his present stock in trade consists of 500 trout, which will weigh from 1¼ to 1½ pounds each; 5,000 which will weigh 1 pound each; 20,000 which will weigh from 8 to 10 ounces, and 100,000 which will weigh from 2 to 4 ounces. In three years' time he thinks he will be able to send to market 200 tuns per annum.

Dingler's Journal recommends as a lute for covering the corks of vessels containing benzine or any of the light hydrocarbons or essential oils, a paste made of finely-ground litharge and concentrated glycerin. The mixture is spread over the corks or bungs, and soon hardens. It is insoluble in the said liquids, is not acted upon by them, and is quite inexpensive, as the commonest kind of glycerin can be used.

REPORT ON HEAVY ORDNANCE.—We are indebted to the courtesy of Hon. J. A. Garfield for a copy of the Report of the Joint Committee on Ordanance, presented to the U. S. Senate, February 15, 1869, for which he will please accept thanks. The notice of the subject-matter of this report is reserved for a future occasion.

WE, this week, conclude our series of articles on the manufacture of beet root sugar. They comprise the most copious and reliable information ever published in America on this industry, and may take the place of a hand-book with manufacturers and others who wish to be informed in regard to it.

PAGLIARI, an Italian chemist, has invented a kind of paper with which carbolic acid is so thoroughly incorporated that the paper when used to pack animal substances preserves them in a perfectly fresh state, without salt or any curing whatever.

NEW PUBLICATIONS.

PRINCIPLES AND PRACTICE OF ARCHITECTURE. Comprising Forty-six folio Plates of Plans and Details of Churches, Dwellings, and Stores Constructed by the Authors. Also an Explanation and Illustrations of the French System of Apartment Houses and Dwellings for the Laboring Classes. Together with Copious Text. By Sanford E. Loring, Architect, Chicago, and W. L. B. Jenney, Architect, Chicago, Graduate of the *Ecole Centrale Des Arts et Manufactures*, Paris. Chicago: Cobb, Pritchard & Co. Cleveland: Cobb, Andrews & Co. Philadelphia: Claxton, Remsen & Haffelfinger. Cincinnati: Robert Clarke & Co.

This work, though it contains a large number of artistic designs, as its title sets forth, is by no means devoted to this department to the exclusion of full discussion of the fundamental principles of architecture and other important topics connected with the art. The work is a large quarto, of which nearly one-third is devoted to the review of the history of the most important styles of architecture, truth in art, theories of construction, and a most important chapter on modern French architecture, in which the subjects of apartment houses of Paris and workingmen's cottages are elaborately treated. The illustrations are of a most excellent character, and as a speciman of a publication of this kind, the execution is praiseworthy throughout. We have not met with an architectural work more adapted to the wants of building associations than this, and its adaptability to the wants of young architects is unquestionable.

MODERN PRACTICE OF THE ELECTRIC TELEGRAPH. A Hand-Book for Electricians and Operators. By Frank L. Pope. New York: Russell Brothers, Publishers, 28, 30, and 32 Center street.

Mr. Pope, well known as a practical operator and electrician, and for merly connected with the office of the SCIENTIFIC AMERICAN, has given us an octavo of 128 pages, upon the above subject. His qualifications, both theoretical and practical, peculiarly fit him for work of this kind. He has had a large experience in constructing telegraph lines, and has spent much time in chemical and electrical researches. The book is written with a special regard to the general ignorance which prevails among operators about the theoretical part of their profession. Such knowledge is needed to change their labors from the drudgery of mere mechanical routine, to an intelligent and interesting occupation—one in which the brain may find employment as well as the hand. As a work of reference the book has one serious fault—it lacks an index. This want is, however, partially supplied by a copious table of contents. The book commences with a discussion of the various batteries in use for telegraphic purposes, and the generation of electric currents therefrom, from which starting point the subject is amplified in a plain and practical way through all its ramifications.

THE ECLECTIC, for June, contains a picture of Alexandria II. Articles—The Physical Basis of Life; Fergusson's Tree and Serpent Worship; Other Inhabited Worlds; Genius in Love; A Whist Reminiscence; Professor Tyndall on Sound; The Northmen, Heathen and Christian; The Mystery of the Grange; Lanfrey's Napoleon I.; He Knew he was Right, Chaps xxii., xxiii., and xxiv.; Physical Education; A Night Among Wild Fowl The Recluse of Pulo-Penang; A Lunatic Colony; Alexander II., Emperor of Russia. Poetry. Notes on Books. Art. Science. Varieties. Terms of the Ecletic, $5·00 per annum. E. R. Pelton, Publisher 108 Fulton street, New York city.

THE ARCHITECTURAL REVIEW AND AMERICAN BUILDERS' JOURNAL for May comes to hand with its usual beautiful illustrations and a rich array of reading matter.

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MANUFACTURING, MINING, AND RAILROAD ITEMS.

The Minister of the Treasury of the Peruvian Government has recently offered to lease the quicksilver mine of Huancavelica to any responsible company or man for 100 years, at a rent of $5,000 per annum for the first 10 years, increasing afterwards, the lessee to give bonds for the prosecution of the work, and to incur a fine of $200,000 if the mine should be injured by false excavations. The Huancavelica mine is about 240 miles from Lima, and has always been regarded as little inferior to the celebrated Almaden mine in California; but the bad state of the Huancavelica, and the great obstacles offered by the mountain roads, have prevented it being profitably worked.

The Vienna Board of Trade have published a report on German railways, including those of the German Austrian provinces. According to this there were 13,639 English miles open for public traffic. The working expenses amounted in the highest case to between 96 and 100 per cent on the gross receipts, and in the lowest to 30 per cent, namely, the Turnau-Kralup and Kaiser Ferdinand's line. The highest dividend paid was 25 per cent, the lowest 2 per cent, and there were seven lines that paid nothing. By accidents during the last three years, from 1865 to 1868, there were 473 persons killed and 636 injured.

During the rainy season the macadamized roads of Paris are frequently inches deep in what is called macadam milk, which is a great nuisance in the sewers, filling them up very rapidly. An adventurous individual has found an application for this stuff, and at the same time, it is said, an income of £2,000 a year for himself. He collects the milk, allows it to settle in large tanks, passes the precipitate through silk sieves, and forms it afterward into what we call Flanders bricks, for knife cleaning, which sell at a franc each.

Addison county, Vermont, appears to be making progress in the raising of the poppy and manufacture of opium. It is stated that last year, a man in Monckton raised poppies and manufactured opium to the value of $3,000, and a number of farmers propose this year to cultivate the plant quite extensively. There are to be several acres of poppies on one farm in East Middlebury.

SILVER COIN.—Silver was first coined by the Lydians, by Phidon of Argos, 869 B.C. At Rome it was first coined by Fabius Pictor, 269 B.C. Used in Britain 25 B.C. The Saxons coined silver pennies, which were 22½ grains weight. In 1302, the penny was yet the largest silver coin in England. From 1816 to 1840 inclusive, there were coined at the mint in London, 11,108,295*l.* 15*s.* in silver, being a yearly average of 444,330*l.*

The Government Commission have reported favorably on the plan of Mr Roebling for the East River Bridge, holding that a hight of one hundred and thirty-five feet, will not be an obstruction to commerce, and therefore the requisite Government consent, as provided for in the act of Congress, should be forthwith given to the proposed structure.

A new route is to be opened to India, from England, by way of Ostend, *via* Innspruck and the Tyrolese Alps. The same car will run through from Ostend to Brindisi, at the southeast end of Italy, and the passengers from London will reach Egypt in six days, or one day less than by way of Marseilles.

It has recently been decided by the New Hampshire Supreme Court, that travelers must withdraw their baggage from the keeping of railroad companies upon arrival; that the companies are under no obligation to store the baggage, and are not liable for its loss if "not removed within a reasonable time."

The *Boston Journal*, of May 19, reports that in the second week of May, the Hoosac tunnel at the east end, was driven thirty-two feet, and good progress made at the shaft and other headings. Five and a-third feet on one face is the best progress thus far made.

Reports from Nevada state that the ore from the Hale and Norcross lower level assays as high as $125 per tun, and that the whole mine yields at the rate of 1,100 tuns per week, averaging upwards of $60 per tun.

Parties in Albany are making arrangements to commence the manufacture of matches by a new process. They will use sodium instead of phosphorus. Sodium is as easily ignited, and is free of the unpleasant smell that attends phosphorus.

With the announcement of the completion of the railway to the Pacific comes the information that the last rail has been laid on the Rock Island and Council Bluffs road, thus finishing this line from Chicago to Omaha, and opening a competing road to the Missouri river. The work was pushed forward with remarkable energy.

A party of gentlemen in Jackson, Mich., recently organized a company for the manufacturing of soda ash, sal soda, bicarbonate of soda, caustic soda, chlorate of potash, and muriatic acid. Three hundred hands will be employed. The capital is about $500,000.

The Kansas Pacific Railway is now in operation from State line (Kansas City) to Sheridan, near eastern boundary of Colorado and head of Smoky Hill river, 405 miles; Leavenworth & Lawrence branch, 34 miles; Wyandotte branch, 2 miles. Total, 441 miles.

There are fifteen hundred miles of railroad under contract in Indiana. That State has never made such progress in the construction of railroads as she is making this year.

A large hotel, saw mill, shingle, and clapboard mill, a large tannery, a musical instrument factory, several stores, and a masonic hall will be erected in Foxcroft, Maine, during the coming season.

The Erie Railroad Company sell through tickets by the Union Pacific Railroad, from New York to San Francisco for $197 35.

The first invoice of tea from Japan for St. Louis was shipped on the 10th May, thus inaugurating the overland trade with China and Japan.

The Amador mine, at Sutter creek, according to the *Amador* (Cal.) *Ledger*, produced $65,000 during the month of February.

The pig iron product of Great Britain in 1858 was 4,800,000 tuns; the United States, 1,603,000, and Pennsylvania furnished 925,555 of this amount.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1·00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

L. L. G., of Mich., and O. R., of N. Y.—Your criticism of rule for determining the pressure in a boiler when it blows off, published in "Answers to Correspondents" on page 300, current volume, arises from your misunderstanding of our use of the terms "long and short arm" of a lever. We used these terms in preference to "leverage of the forces," because we supposed they would be better understood, premising that when employing them in a formula it would be seen by all that measurement from the fulcrum was meant; so that in a lever of the third order like that of the ordinary safety valve, the long arm would be the entire length of the lever, and the short arm the distance from the valve stem to the fulcrum.

F. W., of Oregon.—The "sett" of a wagon wheel should be such that the spokes should stand perpendicular on a level surface as they stand under the axletree. "Gather" we believe to be a fallacy. If however, any of our correspondents differ from us in opinion, we are open to conviction.

J. F. B., of Ind.—The best way to set a horizontal boiler, is, to have the firebox at least as wide as the boiler, and have as much heating surface as possible, but below the water line. All passages should be made large; so as to allow a free passage to the heated gases, and where they leave the boiler the passage should be made so as to open or close by a damper. The bridge wall, should be high enough to prevent the coal from being thrown over, and the grates should be low enough to allow ample room for combustion. Nothing can be gained by putting the fire near the boiler, or contracting any of the passages; it is better to let the heat diffuse itself fully throughout the entire heating surface. The shorter the steam is cut off in an engine, the more coal is saved; providing the engine is large enough, and runs fast enough, and the cylinder and steam chest are protected by a perfect non-conductor. Cutting off at one-third of the stroke the engine will give twice the power with the same fuel, and so on in the same proportion. There are two kinds of cut-offs, the fixed and the variable which are regulated by the governor. Where the power required is variable, the latter one gives the best result, but where it is constant the fixed cut-off does equally as well. The grate surface for your boiler should be about 14 feet.

J. W., of Kansas.—The specimens sent are not aerolites, but simply chalk flints washed out from chalk beds. The white exterior which you think shows where the surface has been burned, is the hardened chalk, having a scored or indented surface produced by the washing away of the soft chalk. Chalk beds are composed of the calcereous or soft shells of marine animals; the moss agates are also composed of shells of a harder nature, due to the presence of silex. Most chalk beds contain small masses of these silicious shells, which form isolated nodules of flint. They are picked up among the alluvial deposites, and go by the name of moss agates.

J. G., of N. J.—We are satisfied that all things considered, pine is the best timber for pump logs, wooden pumps, etc. Cucumber wood, would not be so likely to give the water a taste at first as pine, but whether this property is combined with power to resist decay to so great a degree as pine under the same circumstances can only be settled by experiment.

J. L., of Pa.—According to Bernoulli, the pressure at which steam becomes water is 8,500 atmospheres, and the temperature 800°C. These figures are considered too small by some more modern investigators. Your last query is too indefinite.

M. E. C., of Wis.—We infer from the piece of boiler you send us, that the iron was of bad quality, too thin, and that it had been overheated, either of which causes, or all combined would accouut for the explosion of your boiler.

S. R. S., of La.—We have never published the machinery to which you refer for laying down rail, such as was employed on the Central Pacific Railroad.

H. W., of N. Y.—We do not know that dynamite is on sale in this city but you could ascertain by addressing Tal. P. Shaffner, New York city.

J. N. C., of Ind.—A liquid blueing considerably used latterly is the soluble or basic Prussian blue, made by the action of ferrocyanide of potassium on a proto-salt of iron, and subsequent absorption of oxygen. You can get it from druggists.

C. G., of Ind.—The causes for the springing of a shaft are enumerated on page 243, current volume. The obvious remedy is the removal of those causes.

J. W. S., of Me.—The heat of the electric light produced by two of Bunsen's elements, if proper adjustments are made with the apparatus used, ought to melt silver or copper.

J. W. H., of Iowa.—Your query is based on insufficient data. It can not be answered without you state number of strokes per minute, length of stroke, and area of piston, as well as pressure in boiler.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

TRIPLE BEARING FOR AXLES, SHAFTS, ETC.—Reuben Daniels, Woodstock, Vt.—This invention relates to a new axle bearing, which is to be so constructed, that it can be used for a considerable length of time, and that it can, at any time, be readjusted when worn, by merely turning one or more set screws. The invention consists in interposing in an internal groove of one of the pieces constituting the body of the journal box a loose bar or plate of anti-friction metal, which can be forced against the axle or shaft by means of one or more set screws, and which will therefore keep the shaft tight in its bearing, as it can be forced further down when worn.

WINE AND CIDER MILL, AND PRESS.—Jacob Scholer, Burlington, Iowa.—The object of this invention is to construct a mill and press for the purpose of manufacturing cider, wine, etc., having its parts so arranged and adapted to operate together, as to render it much more effective, convenient, and economical of time and labor, than any heretofore brought into public use.

SLIDING DOOR.—Edmond Prud'homme and P. Moses Leprohon, New York city.—This invention relates to a new means for retaining sliding doors between their guides, even if they should shrink or settle irregularly or evenly, and has for its object to overcome the frequent annoyance resulting from the working of the upper dowel pins out of the groove or track provided for them. The invention consists in providing rollers on the upper edges of sliding doors, the rollers being hung in frames or bars that rest on springs provided on, or in the door, so that by means of these springs the rollers are constantly held up against the upper frame, and retained in the groove provided for them.

APPARATUS FOR SUPPLYING AIR TO HYDROCARBON BURNERS.—James Stratton, Philadelphia, Pa.—This invention relates to an improvement in the method of supplying air to hydrocarbon burners, whereby a fan is employed which forces a current of air into a reservoir, partially filled with water, in which are two or more floats which regulate a valve communicating with a pipe of any desired length, which conducts the air to the burner. It also relates to an improved swinging bracket lamp, to be used in connection with the other parts of the invention.

WRINGER.—S. W. Palmer and J. F. Palmer, Auburn, N. Y.—This invention relates to a a new clothes wringer, which is so arranged that the adjustable upper roller can be readily moved up or down, and always remain in gear with the lower roller, and that by simple means considerable spring power will be obtained.

BED BOTTOM.—E. C. Holden and E. L. Brocket, Owatonna, Minn.—This invention consists, first, in a peculiar construction of slats for bed bottoms, in three pieces, whereof two are parallel and the third curved between the other two; and second, in hanging the foundation piece of each slat upon crank shafts, one at each end, said shafts being placed longitudinally of the end pieces of the bed frame.

VENTILATOR FOR RAILROAD CAS, ETC.—T. J. Mell, Macon, Ga.—The present invention relates to a new and useful improvement in the mode of ventilating railroad cars, houses, etc., the object of which is to draw off the heated or foul air from the highest point in the car or building by opening the ventilator, which is so arranged in the roof of the car or building that when open the passengers of the car will not be troubled with cinders, dust, or leakage through the same.

RAILROAD SWITCH.—Thomas Daly, Erie, Pa.—This invention consists in a novel and useful apparatus for simultaneously operating the switch and signal of a railroad, by one and the same movement, so that every time the switch is changed, the signal shall also be changed so as to show the proper color

VENTILATOR.—M. E. Mead, Darien Depot, Conn.—The present invention relates to a new and useful improvement in automatic ventilators, for dwellings, stables, chimneys, etc., the object of which is by so connecting the slats on opposite sides by rods running across between them, that the said slats may be simultaneously operated upon and closed by the force of the wind blowing against them on the windward side and opened on the leeward side, thus enabling the ventilator to be kept open at all times on the leeward side.

SHOE PATTERN.—James A. French, Scenery Hill, Pa.—The object of this invention is to enable the manufacturer to cut the leather to the best advantage, and also to save labor in making the shoe.

MILL FEED.—Martin Weaver, Terra Hill, Pa., has obtained a patent for an improvement in a mill feed the object of which is to prevent clogging in the eye of the stone, to feed regularly, by means of a vessel fitting into the eye of the runner with four tubes in the bottom entering through the angles of the cross ring. There is a stationary cup, provided with side wings and slotted arms, suspended from the case, and made adjustable.

COMBINED PLOW CARRIER AND COTTON CHOPPER.—Fielding L. Kirtley, Cleyborne, Texas.—This invention relates to a frame mounted upon two wheels and arranged for supporting plows while in the act of turning up the earth; and it consists in so attaching the plows to the frame that the former shall not partake of the rising and falling motions of the latter as in passing over rough ground, and that the plows may be easily shifted, so as to substitute one kind of plow for another, and that the plows may be drawn directly by the traces and not through the attachment to the frame.

MACHINE FOR FILLING HORSE COLLARS.—George W. Hobart, Silverton, Oregon.—This invention has for its object to furnish a simple, convenient, and effective machine for filling or stuffing the rims or balls of horse collars, by means of which the work may be done easily, quickly, and well.

SHEARS FOR CUTTING IRON.—John Nichol, New York city.—This invention has for its object to furnish an improved shears for cutting sheet metal of any desired size, and which shall be so constructed and arranged as to hold the metal securely, and cut it smoothly and true, however large the sheet or plate may be.

HAND CORN PLANTER.—L. O. Hayworth, New Cumberland, Ind.—This invention has for its object to furnish an improved hand corn planter, simple in construction, easily operated, reliable and accurate in operation, and not liable to get out of order or to become clogged or choked up.

IRON LASTS.—J. Godfrey, New York city.—This invention has for its object to furnish an improved iron last, which shall be so constructed that the same last may be used for different-sized boots and shoes, avoiding the necessity of having a set of lasts.

WAGON BRAKE.—Anson Peirce, Lake City, Minn.—This invention has for its object to improve the construction of that class of wagon brakes that are operated by the forward pressure of the wagon in descending a hill, so as to make the brakes more satisfactory and reliable in operation.

INSECT TRAP.—B. M. Quint, St. Joseph, Mich.—This invention has for its object to furnish an improved trap for removing curculio, and the wormy and blighted fruit from peach and other fruit trees, which shall be simple in construction, and convenient and effective in use, enabling the work to be done with great rapidity.

PEN HOLDER.—George Harrison, New York city.—This invention relates to a new and improved device for discharging or removing metallic pens from their holders after they have become useless.

GANG PLOW.—J. W. Lewis, Oregon City, Oregon.—This invention relates to a new and improved gang plow, and it consists in a peculiar construction and arrangement of parts.

FASTENING FOR COLLARS.—M. B. Battey, Washington, D. C.—The object of this invention is to provide for public use, a simple, cheap, and convenient fastening for collars, which can be readily and easily applied to any collar, and which will hold the same securely fastened.

COFFEE ROASTER.—Israel Long, Terre Haute, Ind.—This invention comprises a new method of adjusting the hight of the vessel from the fire together with a new and improved construction of stirrer.

HORSE HAY RAKE.—Frederick Ebert, Saxonburg, Pa.—In this invention the penetrating point of the instrument is formed of two opening and closing teeth, operated by a central rod, with a tripping and locking lever of peculiar construction and operation. When the teeth are closed they form a cutting point; when open, they operate as lifting arms, which hold and raise the hay.

BREECH-LOADING FIREARM.—Wm. Bacon, Monticello, Kas.—The object of this invention is to so improve the construction of breech-loading ordnance that the breech can be opened and closed more easily and effectually than heretofore, while the lock or firing apparatus is so improved as to make it more simple, convenient, and certain in operation. The barrel, also, is constructed in a novel manner, whereby its strength is increased and its cost diminished.

REVOLVING SHOW CASE.—O. H. Melendy, Delhi, Iowa.—The object of this invention is to provide for public use, a cheap, convenient, and ornamental show case, in which a rotary box is employed to hold the article, and is divided into several compartments, that are shown through the glass cover of the inclosing case, said box being so constructed that it can be rotated about a vertical axis, so as to bring any one of the compartments under a door or lid near one side of the inclosing case, and allow articles to be inserted or removed through the same.

THILL COUPLING.—Charles E. Sweney, Geneseo, Ill.—This invention relates to a new and useful improvement in couplings for thills, shafts, and poles for carriages, and for all descriptions of wheeled vehicles, whereby simplicity, durability, and perfect security are combined.

SAW-FILING MACHINE.—Albert Thompson, Ridgeway, Pa.—This invention relates to a new and useful machine for filing saws, more especially designed for filing circular saws used in sawing boards, and other descriptions of lumber, and it consists in suspending or hanging the machine in such a manner that it may be adjusted to the saw while it is attached to, and suspended from the frame of the mill or from any convenient fixture.

PIANOFORTE.—Edward Bloomfield and Dwight P. Otis, New York city.—The object of this invention is to strengthen the treble section of the bridge in a pianoforte by applying a screw pressure to a leaden bar placed upon the bridge.

THREAD GUARD.—George W. Dalbey, Carrollton, Miss.—This invention relates to a new and useful improvement in an article for female use, and consists in a cylindrical guard for enclosing a spool of thread, the cylinder being parted or cut so as to spring around the spool, and with its edge notched so as to form a cutter for the thread.

SAW-GRINDING MACHINE.—Thos. Gamble, Richmond, Va.—This invention relates to improvements in machines for grinding saws, the object of which is to provide a more convenient method of adjusting the stones as they wear away.

BINDER FOR LIDS OF GAS RETORTS.—Andrew Fulton, Albany, N. Y.—This invention relates to improvements in apparatus for securing the lids of gas retorts, designed to provide a simple and efficient clamping apparatus which may be conveniently operated for opening and closing the retorts It consists in an arrangement of clamping levers, supported in arms projecting from levers formed upon the retort near the mouth.

HEELS FOR BOOTS AND SHOES.—M. H. Prescott, Ottawa, Ill.—This invention relates to improvements in the construction of heels for boots and shoes made of metal, or mostly of metal; and it consists in an arrangement designed to make a more reliable connection of the same to the boot or shoe, and which will permit the heel to be readily removed.

COFFEE POTS.—W. C. C. Erskine, Nether Kinnedder, Dunfermline, Scotland.—This invention relates to improvements in coffee pots designed to provide a better arrangement for extracting the essence of the coffee and separating it from the grain than any now in use. It consists in a filtering or straining device attached to the top of an ordinary coffee pot, for containing the coffee and straining the hot water through it.

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HEATING SHOE.—William Rogers, New York city.—This invention relates to a new and useful device for keeping the feet of invalids and others warm, more especially designed to be used by patients in sick rooms and hospitals; and the invention consists in making a shoe, boot, or sock, of any suitable material, as felt or woolen fabric, with a pocket or compartment in its under side or beneath the foot when the shoe is worn, in which pocket or compartment may be placed any heat retaining material, as stone, wood, metal, or composition in the form of a block or blocks, or any heated substance, as salt or bran, or any heated liquid, the pocket or compartment in the latter case being made of rubber or water-tight, with a tight stopper thereto, or the liquid may be contained in a metallic or glass vessel, which may be used instead of the block as first stated, in which case an india-rubber or water-tight compartment would not be required.

TACKLE BLOCK.—H. O. Winsor, Duxbury, Mass.—This invention relates to improvements in tackle blocks, such as are used for supporting pulleys for raising heavy weights, by means of ropes passing through the said blocks over the pulleys, and is designed to provide a means for readily discharging the rope therefrom, or engaging it therewith without the labor and delay of drawing the rope lengthwise through the opening.

HORSE HAY RAKE.—Albert Tschop and Jacob Hartman, East Berlin, Pa.—This invention relates to that class of horse hay rakes, in which a tripping lever is operated by a ratchet attached to the hub of the wheel, and consists first, in the employment of a guide-plate to hold the end of the lever, and prevent it from bending or breaking; secondly, a device for graduating the position and controlling the action of the eccentric, which releases the tripping lever from the ratchet; and thirdly, a strengthening rim or flange for the ratchet.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

Sample cards of cutlery, fancy goods, wood carvings, etc., are successfully photographed by Rockwood, 839 Broadway.

Clothes Wringer—The Rowell patent double-gear clothes wringer, the merits of which the "N. E. Farmer" recommends so highly, may be found advertised on the back page of this paper.

Rogers Molding Machine—nearly new, in perfect order—for sale low. Hussey & Whittemore, 35 and 37 Park Place, up stairs.

$250 will buy a good shingle and heading machine of T. H. Knollin, Oswego, N. Y.

A Revolution in buying and selling, manufacturing and introducing Patents and Patent articles of all kinds. Inclose stamps. National Patent Exchange, Buffalo, N. Y.

Every Mechanic should have Baxter's Adjustable "S" Wrench. No. 8, Vol. 20, this journal. Baxter Wrench Co., 10 Park Place, New York.

Peck's patent drop press. For circulars, address the sole manufacturers, Milo Peck & Co., New Haven, Ct.

A. A. Fesquet, practical and analytical chemist. Construction of chemical works, etc., 323 Walnut st., Philadelphia.

Stencil goods and dies, E. H. Payn, Payn's Block, Burlington, Vt.

Automatic Lathes, for spools, tassel molds, and druggists' boxes, made by H. H. Frang, Jonesville, Vt.

A complete set of Blanchard Plow-handle Machinery, consisting of lathe, bender with 40 forms, and finishing machine. Has been used but a short time, and is in good order. Address S. N. Brown & Co., Dayton, O.

Builders, and all who contemplate making improvements in buildings, can save time and money by addressing A. J. Bicknell & Co. Publishers, Troy, N. Y., or Springfield, Ill.

Saw Mills can find a steady purchaser for "Cheap" oak, elm, etc., sawed into shape, by addressing Box 6,721, New York Postoffice.

Johnson's Adjustable Hangers for shafting. Diploma awarded by the American Institute. Shop rights twenty-five dollars. Pattern castings 6 cents per lb. Address Wm. Cowin, Lambertville, N. J.

The Tanite Emery Wheel—see advertisement on inside page.

An English machine-making firm is open to make arrangements to manufacture and introduce in England any good American invention. Satisfactory references given. Address Box 1233 Postoffice, N. Y.

Henry W. Bulkley, Mechanical Engineer, 70 Broadway, New York, intending soon to visit England, etc., will attend to professional business requiring an agent abroad.

Machine for bending fellies—Patent for sale—the whole, or State Rights. Address DeLyon & Werner, Canton, Miss.

Diamond carbon, formed into wedge or other shapes for pointing and edging tools or cutters for drilling and working stone, etc. Send stamp for circular. John Dickinson, 64 Nassau st., New York.

The Tanite Emery Wheel.—For circulars of this superior wheel, address "Tanite Co.," Stroudsburgh Pa.

The Magic Comb will color gray hair a permanent black or brown. Sent by mail for $1·25. Address Wm. Patton, Treasurer Magic Comb Co., Springfield, Mass.

W. J. T.—We think the patent asbestos roofing manufactured by H. W. Johns, of this city, is the best substitute for tin or slate. It is cheap and easily applied.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Machinists, boiler makers, tinners, and workers of sheet metals read advertisement of Parker's Power Presses.

Mill-stone dressing diamond machine, simple, effective, durable. Also, Glazier's diamonds. John Dickinson, 64 Nassau st., New York.

Water-wheel Patents, Nos. 24,435 and 27,673 for sale. Price $1,000. The "first" that used an adjustable diaphragm in wheel and guide R. Ross, Middlebury, Vt.

Mortising Machines—Two second-hand Lane & Bodley hub-mortising machines, wood column. Will be sold cheap. Address S. N. Brown & Co., Dayton, Ohio.

An Iron Constitution

Is an appropriate figure of speech, as applied to a robust organization; for without a sufficiency of iron in the system, it can neither be strong nor enduring. Bearing this fact in mind, let all who suffer from nervous disease or physical debility, whether general or local, put their trust in Stafford's Iron and Sulphur Powders. The combination is charged with the two elements which science declares that the weak and nervous need—iron, to augment the vital forces; and sulphur, to disinfect the blood and the secretions. For debility, in all its varieties, and whether arising from general or specific and peculiar causes, the Powders are the most potent of all remedies. They are especially adapted to the cure of sexual disabilities. Sold by Druggists. 1 Package, 12 Powders, $1; 3 Packages, 36 Powders, $2.50. Mailed free. HALL & RUCKEL, 218 Greenwich st., New York.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING MAY 18, 1869.

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90,327.—MANUFACTURE OF BLACK PIGMENT FOR MAKING SHOE BLACKING, ETC.—G. F. Wilson, East Providence, R. I.
90,328.—PROCESS OF TREATING OFFAL GELATINE AND SCRAP FOR THE MANUFACTURE OF FERTILIZERS.—George F. Wilson, East Providence, R. I.
90,329.—BEDSTEAD FASTENER.—H. S. Wing, Plattsburgh, N. Y.
90,330.—REVERSIBLE HINGE.—H. J. Walters, Salem, Mass.
90,331.—COOKING STOVE.—A. C. Corse, Troy, N. Y.

REISSUES.

71,837.—TEA AND COFFEEPOT.—Dated Dec. 10, 1867; reissue 3,437.—Alfred Arnold, Tenafly, N. J.
62,807.—CONSTRUCTION OF COAL SCUTTLES.—Dated March 12, 1867; reissue 3,438.—Alfred Bardell and Samuel Smith, New York city.
48,242.—DOOR BELL.—Dated June 13, 1865; reissue 3,439.—P. Corbin and F. Corbin, a joint-stock corporation, New Britain, Conn., assignees of Andrew Turnbull.
85,289.—STEAM ENGINE EXHAUST VALVE.—Dated Dec. 29, 1868; antedated Dec. 23, 1868; reissue 3,440.—Thomas S. Davis, Jersey City, N. J.
85,396.—MACHINE FOR CUTTING VITREOUS SUBSTANCES.—Dated Dec. 29, 1868; reissue 3,441.—W. T. Davis and Austin De Wolf, Greenfield, Mass., assignees of Ozi M. Pike.
64,410.—DEVICE FOR FORMING LETTERS AND FIGURES ON TYPE BLOCKS.—Dated May 7, 1867; reissue 3,442.—Daniel A. Draper, Cambridge, Mass.
41,688.—MACHINE FOR MAKING SPLINTS FOR BARREL HOOPS.—Dated Feb. 23, 1864; reissue 3,443.—Helen Dougherty, Rochester, N. Y., assignee, by mesne assignments, of John B. Dougherty.
48,366.—TREMOLO ATTACHMENT.—Dated June 27, 1865; reissue 3,444.—Alonzo Hitchcock, G. G. Saxe, and J. H. Robertson, New York city, assignees of R. W. Carpenter.
12,956.—MITER MACHINE.—Dated May 29, 1855; reissue 3,445.—G. W. La Baw, Jersey City, N. J.
60,529.—COLLEGE CABINET.—Dated Dec. 18, 1866; reissue 3,446.—W. W. Levering, New York city.
19,442.—HARVESTER.—Dated Feb. 23, 1858; reissue 3,447.—Division C.—C. H. McCormick, Chicago, Ill., assignee, by mesne assignments, of H. A. Parkhurst.
84,838.—BRIDLE.—Dated Dec. 8, 1868; antedated Dec. 1, 1868; reissue 3,448.—John McKibben, Lima, Ohio.
70,038.—APPARATUS FOR CASTING REFRACTORY METAL.—Dated Oct. 22, 1867; reissue 3,449.—Metallic Compression Casting Co., Boston, Mass., assignees of Michael Smith.
51,486.—HORSE RAKE.—Dated Dec. 12, 1865; reissue 3,450.—D. P. Sharp, Ithaca, N. Y.
87,226.—PROCESS AND APPARATUS FOR SEASONING AND IMPREGNATING WOOD WITH PRESERVATIVE MATERIALS.—Dated Feb. 23, 1869; reissue 3,451.—Martin Voorhees, Princeton, and George W. N. Custis, Camden, N. J.
22,681.—COOKING STOVE.—Dated Jan. 18, 1859; reissue 1,684, dated May 31, 1864; reissue 3,027, dated July 7, 1868; reissue 3,452.—Division A.—Eliza C. Stewart, Troy, N. Y., sole legatee and executrix of the estate of P. P. Stewart, deceased.
22,681.—COOKING STOVE.—Dated Jan. 18, 1859; reissue 1,684, Dated May 31, 1864; reissue 3,041, dated July 14, 1868; reissue 3,453.—Division B.—Eliza C. Stewart, Troy, N. Y., sole legatee and executrix of the estate of P. P. Stewart, deceased.

DESIGNS.

3,496 to 3,498.—CENTER PIECE.—Henry Berger, New York city. Three Patents.
3,499 and 3,500.—STOCKING FABRIC.—Thomas Dolan, Philadelphia, Pa. Two Patents.
3,501.—CLOTHESLINE HOLDER.—D. F. Dunham, Auburn, N. Y.
3,502.—STOVE.—Conrad Harris and Paul W. Zoiner, Cincinnati, Ohio.
3,503.—FAN LEAF.—Otto R. Nitsch, New York city.
3,504.—EAVES TROUGH FASTENER.—Wm. Wadsworth, Cleveland, Ohio.
3,505.—TRDAE MARK.—Jas. White, Cleveland, Ohio.
3,506.—TRADE MARK.—H. J. Willing (assignor to Marshall Field and Levi Z. Leiter), Chicago, Ill.

EXTENSIONS.

DOUBLE-GEARED HORSE POWER.—Clement Russell, of Massillon, Ohio.—Letters Patent No. 12,782, dated May 1, 1855; reissue No. 1,302, dated April 15, 1862.
SEED PLANTER.—G. W. Brown, of Galesburg, Ill.—Letters Patent No. 12,811, dated May 8, 1855; reissue No. 508, dated Nov. 10, 1857; again reissued, No. 1,091, dated Dec. 11, 1860.
SEED PLANTER.—G. W. Brown, of Galesburg, Ill.—Letters Patent No. 12,811, dated May 8, 1855; reissue No. 508, dated Nov. 10, 1857; again reissued, No. 1,092, dated Dec. 11, 1860.
SEED PLANTER.—G. W. Brown, of Galesburg, Ill.—Letters Patent No. 12,811, dated May 8, 1855; reissue No. 508, dated Nov. 10, 1857; again reissued, No. 1,093, dated Dec. 11, 1860.
SEED PLANTER.—G. W. Brown, of Galesburg, Ill.—Letters Patent No. 12,811, dated May 8, 1855; reissue No. 508, dated Nov. 10. 1857; again reissued, No. 1,094, dated Dec. 11, 1860.
SEED PLANTER.—G. W. Brown, of Galesburg, Ill.—Letters Patent No. 12,811, dated May 8, 1855; reissue No. 508, dated Nov. 10, 1857; again reissued, No. 1,095, dated Dec. 11, 1860.
SHUTTLE FOR LOOMS.—Lydia W. Litchfield, of Southbridge, Mass., administratrix of Laroy Litchfield, deceased.—Letters Patent No. 12,780, dated May 1, 1855; reissue No. 3,355, dated March 30, 1869.
BOOT AND SHOE STRETCHER.—Warren Holden, of Philadelphia, Pa.—Letters Patent No. 12,793, dated May 1, 1855.
MACHINE FOR BURNISHING METALS.—Jeremiah Stever, of Bristol, Conn.—Letters Patent No. 12,799, dated May 1, 1855; reissue No. 834, dated Oct. 11, 1859; (whole No. 1,205), again reissued No. 100, dated July 2, 1861.
MACHINE FOR LEATHERING TACKS.—M. M. Rhodes and J. C. Rhodes, of Taunton, Mass.—Letters Patent No. 12,832, dated May 8, 1855.

APPLICATIONS FOR EXTENSION OF PATENTS.

FORMING SCREW THREADS, ETC., IN THE NECKS OF GLASS BOTTLES AND SIMILAR ARTICLES.—Sarah T. Stone, of Philadelphia, Pa., administratrix of the estate of Amasa Stone, deceased, has applied for an extension of the above patent. Day of hearing July 26, 1869.

MANUFACTURE OF ZINC WHITE.—John E. Burrows, of Newark, N. J., has petitioned for the extension of the above patent. Day of hearing, July 26, 1869.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

1,255.—APPARATUS FOR PREVENTING THE BURSTING OF STEAM BOILERS.—J. C. Cochrane, Rochester, N. Y. April 23, 1869.

1,256.—PUDDLING IRON.—Charles Hewitt, Trenton, N. J. April 23, 1869.

1,273.—REAPING AND MOWING MACHINE.—S. C. Ridgaway, Baltimore, Md. April 24, 1869.

1,287.—REVERSIBLE PARASOL.—J. E. Banks, New York city. April 26, 1869.

1,288.—STEAM GENERATORS AND CONSDENERS.—B. T. Babbitt, New York city. April 26, 1869.

1,291.—METHOD OF PREVENTING THE CORROSION OF STEAM BOILERS.—G. Hawxhurst and James Pollack, San Francisco, Cal. April 26, 1 69.

1,293.—LOCKS.—James Sargent, Rochester, N. Y. April 27, 1869.

1,315.—RIGGING OF SQUARE-RIGGED VESSELS.—R. B. Forbes, Boston, Mass. April 28, 1869.

1,321.—APPARATUS FOR GENERATING AND CONDENSING STEAM, AND STEAM GENERATORS.—T. T. Prosser, Chicago, Ill. April 28, 1869.

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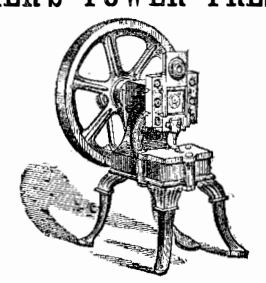

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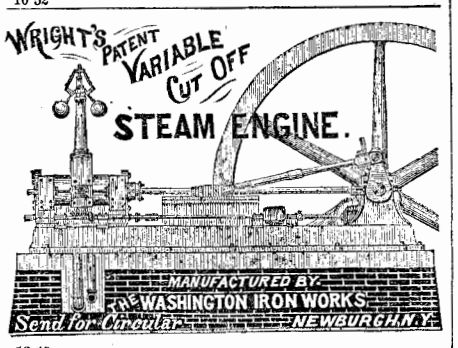

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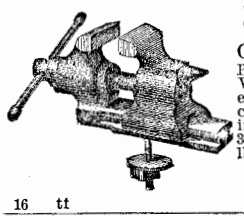

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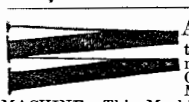

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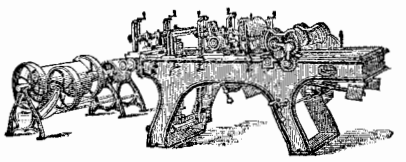

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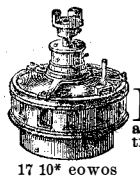

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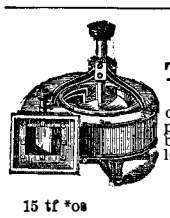

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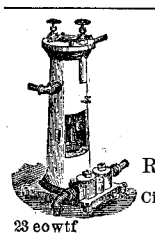

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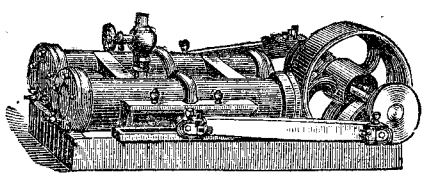

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